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Japan Report

(FOUO 29/82)

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CONTENTS

POLITICAL AND SOCIOLOGICAL

PROPOSAL FOR UPPER HOUSE PROPORTIONAL REPRESENTATION ANALYZED

Tokyo YOMIURI SHIMBUN in Japanese 11 Mar 82 p 5

[Article by Reporter Tsuyoshi Yamazaki: "The Upper House Proportional Representation System That Has Taken Shape"]

[Text] Regarding the problem of revising the Upper House national electoral constituency system, the Japan Socialist Party (JSP) has decided to adopt a proposal for a revised St Lague type of proportional representation system with binding lists. Although it differs from the D'Hondt formula being submitted to the Diet by the Liberal Democratic Party (LDP) in the method of computing the distribution of Diet seats, the cooperation between the LDP and the JSP, the two major parties, toward the introduction of a proportional representation system in the Upper House national district, based on a binding list of candidates, will have a major impact. It appears that the reform of the national district may suddenly loom as the major issue in the last half of the current Diet session.

Change in Diet Seats

The aim of the proportional representation system is to structure the Diet seats in proportion to the votes polled by the political parties. It is derived, as it were, from the idea of designing the Diet as a "microcosm" of the national electorate's will (its support of the parties) and is adopted in virtually all Western European countries with the exception of Britain and France, which use the small electoral district system [the single-member district system]. As a result of the emphasis on votes polled by the political parties, the election becomes a party-centered rather than candidate-centered poll, while the "dead votes" (votes cast for the losers, which are not reflected in terms of Diet seats) decrease in number.

Among such features, the binding candidate list formula is a system whereby, prior to an election, a political party submits a slate of party candidates in priority order and, after the election, it designates as it winners the number of candidates equal to the number of seats allocated to the party. It is a system widely used in elections which are under the proportional representation system. The electorate casts votes for the parties, using the lists of candidates as reference.

The contention of the LDP and the JSP in proposing to introduce the system in the Upper House national district is that, apart from the excessive costs incurred by the present system, the nature of the single national district with its designated 50 seats renders it more readily adaptable to the proportional representation system than the subdivided electoral districts of the Lower House, or the regional districts of the Upper House.

If so, in the event proportional representation is adopted, how would the seats of the various parties in the Upper House national constituency be changed?

The chart below is a hypothetical outcome of the allocation of Diet seats based on votes polled in 1980 and 1977 by the various parties in the Upper House national district elections. It shows figures which would have resulted if the binding candidate-list formula for proportional representation had been used.

Hypothetical Election Results in Upper House National District Based on Proportional Representation

1980	Vote %	Seated	D'Hondt	Revised St Lague	Hare
LDP	42.5	21	24	22	21
JSP	13.1	9	7	7	7
Komeito	11.9	9	6	6	6
DSP	6.0	4	3	3	3
JCP	7.3	3	4	4	4
NLC	0.6	0	0	0	0
SDL	1.1	0	0	0	1
Minor parties/ Independents	17.4	4	-	-	-
Breakdown of Minor Parties/Independents					
Fusae Ichikawa	5.0	1	2	3	3
Yukio Aoshima	4.0	1	2	2	2
Chinatsu Nakayama	2.8	1	1	2	1
Ryokichi Minobe	2.1	1	1	1	1
Columbia Top	1.0	0	0	0	1
1977					
LDP	35.8	18	20	19	18
JSP	17.4	10	10	9	9
Komeito	14.2	9	8	7	7
DSP	6.7	4	3	4	3
JCP	8.4	3	4	4	4
NLC	3.9	1	2	2	2
SCL	2.8	1	1	1	2
Minor parties/ Independents	10.8	4	-	-	-

	Vote %	Seated	D'Hondt	Revised St Lague	Hare
Breakdown					
PLL	2.7	1	1	1	2
Chinpei Nozue	1.9	1	1	1	1
Hideta Yashiro	1.7	1	0	1	1
Keizo Takahashi	1.5	1	0	1	1

(Minor party/Independent counted as a political party or organization.)

There are many types of proportional representation systems. However, only three types are included in the chart: the D'Hondt formula proposed by the LDP, the revised St Lague formula proposed by the JSP and the comparatively easy-to-understand Hare formula.

As the hypothetical figures show, adoption of the D'Hondt formula would clearly be advantageous to the ruling LDP, while the advantage would be less if the revised St Lague or Hare formula were adopted.

Of course, it remains highly questionable whether it is right to take the total votes of a given party, which under present practices is an accumulation of votes garnered by its individual candidates, and make a comparison with a system based on a slate of candidates under which votes are cast for the party. The reason is, although the slate of candidates is used as reference, the fact that the votes are cast for the party invites the possibility that the voter trends would be quite different from the past.

Therefore, the pluses and minuses for the various parties in case of a change to the proportional representation system cannot be judged unqualifiedly. However, from the standpoint of the Komeito, which today conducts the most efficient elections, the proportional representation system would clearly be disadvantageous, no matter what method of computation is used. For example, in the 1980 elections, all 9 Komeito candidates were elected with a total of 6.67 million votes. Under the proportional representation system, this would result in six seats, regardless of the method of computation used. While one seat today equals an average of 740,00 votes, a seat under the proportional representation system would require about 1 million votes. Therefore, the Komeito's favorite tactic of splitting the votes and placing its winners in a cluster in the middle to lower rankings would be impractical.

The JSP has hitherto been basically agreeable to the introduction of the proportional representation system. However, at the party convention in early February, critical opinions emerged, saying: "It might prove to be disadvantageous" or "Are we to follow in the LDP's footsteps?" and it was decided to take another look.

As pointed out by critics at the party convention, the hypothetical figures show that it would be more disadvantageous to the JSP than the present

system under any formula except the D'Hondt formula of 1977. Furthermore, the party appeared to be expressing deference toward the Komeito and the Democratic Socialist Party (DSP), which are cooperating with each other in opposing the introduction of the proportional representation system in the Upper House/regional districts.

Points of Issue in Introduction of System

Notwithstanding this and despite its advantage to the small political parties, compared to the D'Hondt formula, the reason the JSP is proposing the revised St Lague type of proportional representation is that the national district election, which requires such enormous campaign funds as to be cynically dubbed the "money-harsh district," has become a burden to the JSP. Furthermore, it was probably due to the judgment that it could attract a wider range of candidates than the present candidates who consist almost entirely of former labor union cadres, and that it could muster a much wider support in votes by competing as the principal opposition party.

As for the revised LDP proposal, there are many problems pertaining to the treatment of the minor parties and independents.

The candidates of the minor parties and independents, excluding the seven major parties, placed four winners in 1980 with 17.4 percent of the total votes and four winners in 1977 with 10.8 percent of the votes. A trial count of the 1980 election, based on the D'Hondt formula, shows that, if such parties as a "Fusae Ichikawa Party" or a "Yukio Aoshima Party" had existed, they would have won a total of six seats. However, according to the LDP proposal, it is conceivable that even the candidates with that many votes might have lost out. The reason is that the LDP proposal makes it mandatory to assume the form of a political party or organization in order to run in an election. Also, the conditions to run are: to have polled more than 4 percent of the votes in a recent national election, to have 5 or more Diet members in its ranks, or to field a minimum of 10 candidates, including national and local districts.

In this respect, the JSP proposal has eased its conditions for the participation in elections by political parties and organizations. It requires recent election returns of 2 percent, three Diet members and a slate of five candidates.

The recent votes obtained by the minor parties and independents reflect a critical attitude among the electorate who are dissatisfied with the established political parties.

Therefore, in revising the national district system, it seems important that care should be taken not to ignore the wishes of the voters.
[Appendix]

D'Hondt formula--The winners in each party are decided by dividing the total votes by the whole numbers 1, 2, 3...in order. Then, beginning with

the largest quotient, the results are placed in order, up to the designated number of Diet seats allocated. The aim is to average out the number of votes per seat insofar as possible. The formula is adopted in West Germany.

Revised St Lague formula--Instead of the whole numbers used in the D'Hondt formula, odd numbers such as 1.4, 3, 5, etc., are used as dividers. Whereas the D'Hondt formula is advantageous to the larger parties, the St Lague formula uses only odd numbers. However, in order to avoid a flood of smaller parties, it has been revised to begin with the divider 1.4. The formula is used in the northern European countries.

Hare formula--Although the method of computation differs, the percentage of votes won by each political party (for example, 50 percent, which is represented as 0.5) is multiplied by the designated number of seats in the district, and the whole number portion of the resulting figure is translated into the number of seats won. The remaining seats are distributed in order, beginning with the party with the largest fractional number. The problem is, a winner could emerge from a party with extremely few votes. Therefore, few countries have adopted this formula.

5884
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POLITICAL AND SOCIOLOGICAL

PREREQUISITES OF ELECTION DISTRICT REFORM ANALYZED

Tokyo NIHON KEIZAI SHIMBUN in Japanese 8 Apr 82 p 2

[Text] A bill for reform of the Upper House national electoral district has become the focal point of Diet deliberation, following the establishment of the budget. This is because, in addition to Prime Minister Suzuki's deep interest in having the bill passed by the current Diet, a meeting of minds has been reached between the Liberal Democratic Party [LDP] and the Japan Socialist Party [JSP] with regard to reforming of the system by introducing a proportional representation system based on a slate of party candidates in the Upper House national district. However, all of the opposition parties except for the LDP [as published] and the JSP are against the bill, and under such conditions, it would not be advisable to deal forcefully with a problem involving basic political rules, such as the electoral system. Appropriate political conditions are prerequisites for the realization of any reform bill.

One prerequisite is that it is not desirable for a decision to be made merely on the basis of agreement between the LDP and the JSP, but that it should take the form of a bill which could win the support of at least one other party. The second prerequisite is that although there is not much time before the regular Upper House elections in the summer of next year, the Upper House national constituency system should not be dealt with alone, but should be considered together with the revision of seats in the Lower and Upper House local districts.

Being cautious regarding the reform of these systems does not mean that we are opposed to the reform. The fact is, many references have already been made regarding the shortcomings of the present Upper House national constituency system, and it is high time some solution is reached. From the standpoint of the voters, it is not easy to pick one candidate out of nearly 100 candidates in a single voting district. Also, from the standpoint of the candidates, great physical energy and enormous campaign funds are necessary, because the entire nation constitutes a single electoral district. And in conclusion, there is the lamentable fact that a candidate in the national district cannot run unless he has organizational backing or is a celebrity in the performing arts.

The bill for reform of the national district submitted by the LDP and the JSP was conceived as a method of correcting these shortcomings. The merits of

the reform proposal were considered to be, first, the alleviation of personal financial burdens and physical wear and tear on the part of the candidates, by introducing a proportional representation system in the national district and removing the coloring of a single-candidate election. The second prerequisite is to make possible the candidacy of persons with good sense who faced difficulty in the past, by having the respective parties submit a list of their candidates in priority order according to their previous election victories.

However, the LDP proposal has the aforementioned merits on the one hand, but drawbacks on the other. The problems pointed out during the Diet deliberations last fall were: 1) Since the proposal is premised on elections centered on the political parties and precludes the candidacy of independents, it violates Article 14 (equality under the law), Article 15 (freedom of candidacy), and Article 21 (freedom of nonalignment). 2) The introduction of proportional representation expedites the party politicization of the Upper House. 3) The basis of the reform proposal in stipulating party rules is ambiguous. 4) The adoption of candidate lists will tend to encourage the preferred treatment of incumbents. 5) It is questionable whether enough interest could be raised among the electorate when the personal factor is ignored.

As for the theory of unconstitutionality advanced in the opposition arguments, many theories appear to stress that the constitution recognizes the existence of political parties as an indispensable factor for the facilitation of democratic government, and that the adoption of proportional representation is not unconstitutional. However, if the strength of the opposing arguments and the degree of suspicion held by the opposition parties regarding the LDP's intent are taken into consideration, it would seem that it is at least necessary to get the aforementioned two conditions straight before any reform is attempted.

5884
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POLITICAL AND SOCIOLOGICAL

CONSTITUTIONAL AMENDMENT FACTION OF LDP ON RISE

Tokyo MAINICHI SHIMBUN in Japanese 29 Mar 82 p 2

[Text] Former prime ministers Tanaka and Fukuda, who have virtually total influence within the LDP, have become counselors of the Diet Members' Union for the Realization of an Autonomous Constitution (former prime minister Nobusuke Kishi, chairman), which is promoting constitutional amendment. The constitutional amendment issue is once again in the limelight. At present, the LDP's Constitutional Research Council (former justice minister Setoyama, chairman) is divided into subcommittees, and each subcommittee has been conducting specific studies on a draft of an amended constitution. Each subcommittee is supposed to conclude its study by June, and the council expects to write a draft this fall. Since the LDP does not have the two-thirds majority in the Diet required to propose constitutional amendments, it is not in a position to move toward constitutional amendment immediately. But why has "the issue of constitutional amendment" been brought forth now? One reason is its relation to the U.S. request to strengthen Japan's capability to defend sealanes. Some LDP members also intend to promote constitutional debates while the LDP has the majority, and thereby to try to arouse public opinion. We have explored these movements within the LDP....

Chairman Setoyama of the Constitutional Research Council visited Prime Minister Suzuki at the Prime Minister's official residence on the 26th with his recently published book, entitled "Discourses on Constitutional Amendment," and talked to the Prime Minister for 30 minutes. He reported that the basic policy of the council would be to write a draft of an amended constitution this fall. In the meeting he described the necessity for constitutional amendment in the following way:

"After the war, the occupation government started raising the premature baby, Japan, in an incubator. Now Japan has already reached the prime of manhood. Japan's GNP is third in the world. In spite of this, Japan still walks in the world wearing the diaper of a constitution which was provided by the occupation government. Voices have been rising all over the world asking Japan to assume its international role in security, trade, and other fields. Our country, which is now in the prime of manhood, must carry out its responsibilities. Constitutional amendment is one of our responsibilities."

To this, the Prime Minister is said to have given no particular response. Mr Setoyama's objective is to place the constitutional amendment issue among

Japan's international responsibilities. In a meeting with the Prime Minister on the 27th, U.S. Secretary of Defense Weinberger asked Japan to share in the defense of the North Pacific region and requested that Japan increase its capability to defend the sealanes for 1,000 nautical miles. People like Mr Setoyama who are pushing for constitutional amendment judge that the constitutional amendment issue cannot be avoided if Japan is to respond to these U.S. requests for a strengthening of Japan's defensive capabilities. Earlier, over 50 LDP members endorsed the Hundred Person Committee Asking for Revision of the U.S.-Japan Security Treaty. Mr Setoyama's point is in principle the same as the committee's assertion that "the security treaty should be revised so as to make it bilateral in nature, if Japan is to carry out its international role."

As far as movements within the LDP are concerned, the expansion of the Diet Members' Union for Realization of an Autonomous Constitution has encouraged the constitutional amendment faction. In May 1979, there were 178 LDP members who belonged to the Diet Members' Union. Since the overwhelming victory in 1980's double election of both houses, however, membership has been increasing. At present it numbers 295, including independent former prime minister Tanaka; this is over two-thirds of the whole LDP.

Moreover, because former prime ministers Tanaka and Fukuda have become counselors and three important party officials, such as Secretary General Nikaido, have become vice chairmen, the Diet Members' Union will change its characteristics.

At a joint meeting of the Constitutional Research Council and the Diet Members' Union held on the 24th, a draft of the declaration which will be read at a national convention sponsored by the Diet Members' Union on 3 May was discussed. A draft prepared by the executive office was examined. The following opinion was expressed, and they decided to reexamine the draft later. "When we assert [the need for a] constitutional amendment, it tends to be taken as a revival of militarism or as a complete amending of the Constitution. We should make it clear that we want to protect pacifism and democracy. It is also necessary to write a phrase calling for amendment by the people." They said that this was the first time they had had this sort of debate about the declaration. It can be observed that their approach is to place the greatest emphasis on rousing public opinion.

On the other hand, there are some who view coolly the rise of debate on constitutional amendment. "The constitutional amendment issue is one of the questions that the LDP should address after it has obtained an overwhelming majority. Nobody thinks the time is now ripe for a constitutional amendment. Because the number of young Diet members born in the Showa era has been increasing, isn't this debate intended to rouse a mood for constitutional amendment while in the majority, and not to let the constitutional amendment movement wither but to hand it down?" (a Diet member belonging to the Showa Society to Think about the Constitution). There are eight members in four subcommittees of the Constitutional Research Council (which has 40 members) who do not belong to the Diet Members' Union. Chairman Kamimura of the Constitutional General Subcommittee wrote a trial draft of the preamble to the

constitution, but different opinions were presented one after another. Hereafter, each subcommittee will discuss specific matters, such as "how to revise each item." In an item-by-item discussion, it is expected that a wide variety of opinions will be presented.

9896
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POLITICAL AND SOCIOLOGICAL

SUZUKI DENUNCIATION OF CONSTITUTIONAL AMENDMENT PUZZLING

Tokyo SANKEI SHIMBUN in Japanese 29 Mar 82 p 2

> [Text] Prime Minister Suzuki recently "denounced" by name the activities of the Diet Members' Union for Realization of an Autonomous Constitution (former prime minister Nobusuke Kishi, chairman), of which the LDP's constitutional amendment faction forms the nucleus. This created a stir in the LDP. In particular, the Diet Members' Union had just received former prime ministers Tanaka and Fukuda as counselors and was on the point of developing an active movement toward "constitutional amendment," along with the party's Constitutional Research Council (Mitsuo Setoyama, chairman). Some members are asking if "the Prime Minister has forgotten the campaign policies and the party declaration adopted at the party's convention in January." The Prime Minister, who had instructed the party's Constitutional Research Council to write a draft of a revised constitution, and who for a time had showed a positive attitude toward constitutional amendment, has reversed course again. There seems to be something behind all this.

The Prime Minister summoned Chairman Setoyama to the Prime Minister's official residence on the 26th and demanded that the party's Constitutional Research Council be "prudent," saying: "We have not written a draft yet. If a body like the Diet Members' Union for Realization of an Autonomous Constitution talks boisterously without a draft, we could be criticized as scheming for rearmament or a military draft system."

The members of the Diet Members' Union who heard this took the Prime Minister's words as a "denunciation." They seem to have a hard time figuring out what his true intentions were, commenting: "At this late stage, what did he mean by calling us by name and saying that 'we were talking boisterously'?" The Diet Members' Union is proud of its large membership--over two-thirds of the LDP membership of both houses. They understand that "establishment of an autonomous constitution is the party's just cause, and therefore any act to ignore it is a violation of a campaign promise." Since former justice minister Okuno spoke of constitutional amendment last year, the Diet Members' Union has engaged in vigorous activity. Last October it presented a trial draft of amendments for 10 items for which it has been seeking partial revision. At

the LDP convention held in January, "establishment of an autonomous constitution" was included among the campaign policies and in the party declaration. Moreover, the party's Constitutional Research Council has started writing a draft. Consequently, the members of the union were encouraged to think that the time had come for the party as a whole to campaign for constitutional amendment.

Against this background, it is inevitable that Prime Minister Suzuki's "denunciation" appeared to the Diet Members' Union to be an act [intended] to discourage the constitutional amendment movement. In fact, at the liaison meeting between the administration and the ruling party on the 24th, the Prime Minister warned Secretary General Nikaido "to be prudent about the constitutional amendment movement." Moreover, on the next day, the 25th, the Prime Minister asked former prime minister Fukuda, through the secretary general, to approve consideration of the constitutional amendment movement in a prudent manner, since the time is not yet ripe."

As for former prime ministers Tanaka and Fukuda becoming counselors of the Diet Member's Union, the opposition parties have already initiated the criticism that "Suzuki's public promise not to revise the constitution has been revealed to be false." In addition, the protect-the-constitution faction within the LDP has been asserting the need for prudence on the issue of constitutional amendment. Therefore, the Prime Minister's changing attitude could make it appear that "he has been changing his position" sheerly out of a desire to protect himself. Furthermore, he is concerned because "opinion within the party may split over the issue of constitutional amendment, and as a result the political situation this fall will include many disturbances."

One leading member of the Diet Members' Union said: "The significance of former prime ministers Tanaka and Fukuda becoming counselors is great. With both Tanaka and Fukuda engaging in the establishment of an autonomous constitution, the ground within the LDP for constitutional amendment will become as firm as a huge rock...." [This member] also seemed disappointed by the suddenly cold treatment from the Prime Minister.

Some have offered criticism: "Well, the Prime Minister was originally a member of the Socialist Party. He merely repeats pacifism as a holy invocation." Putting aside this criticism, it is natural for the Prime Minister, who wishes to be reelected in this fall's LDP presidential election, to want to avoid disturbances by any means. In spite of his wishes, however, even former prime minister Tanaka, with whom Prime Minister Suzuki has a close relationship that is indispensable for his reelection, recently began to talk publicly about "constitutional amendment." The constitutional amendment movement has been awakening. In this situation, the Prime Minister has confusedly applied the brakes to the movement. This seems to be the truth.

The Prime Minister's attitude is "to not discuss constitutional amendment until a draft is written." However, if politicians suddenly started debating the issue of constitutional amendment after a draft had been written, it would only confuse people. Henceforth, politicians should try to make a "receptive plate" by continuously pointing out to the people the problems of the current constitution and what needs to be revised. This seems to be the proper way to build a national movement.

9896
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POLITICAL AND SOCIOLOGICAL

PROBABILITY OF APRIL DIET DISSOLUTION DISCUSSED

Tokyo SHOKUN in Japanese Mar 82 pp 134-141

[Panel Discussion Among Four Anonymous Diet Members: "Sudden Rumors About Diet Dissolution in April"]

[Text] SHOKUN: In light of LDP Policy Affairs Research Council Chairman Rokusuke Tanaka's outrageous statement, how does the name "Blabbermouth Rokusuke" sound?

Diet member C: What? I'm not familiar with the details. What exactly did he say?

SHOKUN: According to the Tokyo newspapers, he said something like this: "Your question is whether, in the event of a guilty verdict, (the Tanaka faction will come apart and) the political world will be reorganized? Frankly speaking, I think that an innocent verdict is doubtful. I believe from the bottom of my heart that it would be nice if (former prime minister) Tanaka were found innocent, but this is doubtful. I wonder whether the Tanaka faction will really be able to stay united (in the event of a guilty verdict). However, I think that if the Tanaka faction is attacked from without, it will grow more unified. (There are people) even today who, lacking commonsense, are joining the Tanaka faction; what will become of them? Politicians are a different breed (from those with the usual commonsense). As to whether the Tanaka faction will collapse (in the event of a guilty verdict), I think the opposite will happen. The Lockheed trial will continue endlessly, with appeal after appeal, and as long as Tanaka is able to continue his political activities, he will continue to do so. Don't you think so?" This is a statement which Tanaka unexpectedly made during the question-and-answer session following a speech entitled "The Present Political and Economic Situation."

Diet member B: NHK-TV disclosed the statement, and it caused a great stir. "Hey! Rokusuke's done it again!" was the reaction.

Diet member D: A flustered Rokusuke tried to explain away his statement by holding a press conference at party headquarters, but it was too late. Members of the Tanaka faction were furious.

Diet member A: Nikaido supposedly said; "I don't want to see his face again."

B: There were even some who said that shutting the mouth of the blabbermouth chairman of the Policy Affairs Research Council should have priority over administrative reform.

A: That was Ryutaro Hashimoto.

C: From Rokusuke's point of view, however, it probably was just a case of the truth suddenly coming out.

B: Right. Although the subtitle of this series of articles is not "Nagatacho's [Name of the street where the official residence of the Prime Minister is located] True Feelings," it would fit.

C: It would have been more commendable if Rokusuke had shown a defiant attitude and had asked what was wrong with telling the truth.

"Guilty Tanaka" Is "Nagatacho's True Feelings"

D: There is also another view. One analysis holds that this statement might have been a carefully conceived plan on the part of Rokusuke Tanaka to lower the image of Kakuei Tanaka and his followers, so as to help the reelection of Suzuki.

A: Rokusuke, the loyal retainer. (laughs)

B: That's too farfetched. Unfortunately for Suzuki, he has no confidant at present within the Kocki-kai [One of the LDP's "policy groups" (i.e. factional support organizations), originally founded by late Prime Minister Hayato Ikeda in the late 1950's; but now identified as a support group for Prime Minister Zenko Suzuki.] who is that loyal to him. His faction is in a considerable uproar over the Ichi-Roku war and the Ni-Roku war.

SHOKUN: Ni-Roku war?

B: Kiichi Miyazawa versus Rokusuke is the Ichi-Roku war, and Heiji Ogawa versus Rokusuke is the Ni-Roku war. Zenko's ability to control his faction has declined sharply. Rokusuke as a "loyal retainer" would be inconceivable.

D: What actually happened, no doubt, was that Rokusuke's smart-alecky nature got the best of him, and he blurted out the truth.

A: Although "Guilty Tanaka" most certainly constitutes the "True Feelings of Nagatacho," it is a so-called taboo word around the Nagatcho village. For the members of the Tanaka faction, in particular, it's clearly an expression of discrimination. Although now it's a forbidden phrase for the mass media, in the past there was a word for describing a physical defect. To those in the Tanaka faction, it's as though that expression had been said. That's because deep in their hearts they feel inferior for being associated with the Tanaka faction.

B: While mention of "Guilty Tanaka" of course gets them angry, it's also said that the members of the Tanaka faction were angered by the statement: "There are people even today who, lacking commonsense, are joining the Tanaka faction." In other words, they are angry because this seems to imply that joining the Tanaka faction shows a lack of commonsense. (laughs)

D: It really doesn't seem like Rokusuke.

A: In person, he is good-natured and up on the latest information, so he is a very interesting person. Sometimes, however, he is apt to be mistaken in his judgement of the nature of an occasion. (laughs)

D: However, he is surely not a malicious person.

B: Within the party, however, Rokusuke Tanaka is seen as a kind of upstart. Although he has established himself as a new leader, there is a question as to exactly what sort of track record this reputation is based on. Along with the tumult of that double election, when it seemed as if the Obon and New Year's holidays had come at the same time, came the death of Ohira; perhaps because of all the confusion, everybody became very despondent. Rokusuke seized this opportunity to work hard for the speedy creation of the Suzuki cabinet, and that was nimble work for a politician, but that's about all he's done. His skill was recognized, and he gained the posts of minister of international trade and industry and then of chairman of the Policy Affairs Research Council. However, things seem to be going a little too smoothly for him.

D: He's jumped two or three ranks. The Fukuda faction and the Komoto faction don't think too much of that, either.

B: That's the way it stood before his recent statement; now he's angered the Tanaka faction, too.

"Chase the Fleas on Your Own Head!"

A: One consolidation for Tanaka is the fact that he is in a party office and not in a cabinet post. If he had been a member of the cabinet, the cabinet probably would have withered away for lack of cooperation from the Tanaka forces. That might have been true even with him in the party, but if he had been in a cabinet post, the work of the Suzuki government would have been held up. At the very least, the work of his ministry would have been put on hold.

C: Is it true that he went to Mejiro [a district of Tokyo where former Prime Minister Kakuei Tanaka lives] to make an earnest apology?

A: It's true. And not only to Mejiro; it's said that he went in succession to the places of all the leaders of the Tanaka faction, from Nikaido's place to Takeshita's and those of the others, to explain himself.

B: Kakuei supposedly spoke very curtly to him, and said something like: "Before saying something about another person, look for the fleas on your head."

A: "Mister LDP of Mejiro" would like to win an election before the guilty verdict is passed down in the Lockheed trial, because if he is able to change the political situation prior to that, he will be able to change the political situation prior to that, he will be able to pursue his "struggle" for the next 4 years.

SHOKUN: You mean to say that there's going to be an election this year?

A: That's right. Sensing such an odor from Mejiro, eveybody is hurrying to prepare himself for the war to come at any time.

C: The opposition parties see the political showdown as coming in 1982 and not in 1983.

A: Although Tanaka's arrest was an event which shook heaven and earth, a guilty verdict is a preordained event which cannot be avoided. For Kakuei Tanaka, this will be more damaging politically than his arrest. If, in boxing terms, the arrest is a punch taken in the first round, the guilty verdict will be like a punch taken in the late rounds of the fight, so it will have the same effect as a blow to the legs and the stomach.

B: The long-awaited return to power, which he has been developing step by step--with the mass media his enemy the whole while--would be reversed. If an election were then to be held under such circumstances, it wouldn't be a normal handicap either for Tanaka himself or for those around him. By all means, therefore, they want to have an election prior to the verdict.

D: The court hearings will end in April or May. At the earliest, the decision will be made within the year. With this kind of trial, then, that means it may take up to a year to write up the court decision. Therefore, it will be next year.

A: For Kakuei Tanaka, therefore, a dissolution of the Diet this year is a political necessity.

C: Shouldn't the election take place prior to the end of the hearings rather than prior to the verdict? The Mejiro people may be thinking about trying an election before the prosecution makes its final arguments and calls for criminal penalties.

A: I've heard that, too.

D: So, that means this April or May?

A: No, because another of Mejiro's desires is to see how long they can put off the trial's coming to an end. Although only those involved probably know the truth, Enomoto's illness ever since last summer may also have been a precautionary measure taken for the purpose of postponing the trial's conclusion. The mass media are clamoring for an early conclusion to the trial, but as I said in our meeting prior to the last one, I do not think there will be an early end to the trial. As one might expect, the Mejiro people are involved in putting it off.

C: Although an election which came after the prosecution's final argument and call for punishment would not be as bad as an election after a guilty verdict, it would still be a painful situation for the Mejiro people. It is conceivable, therefore, that they will try for a Diet dissolution prior to the conclusion of the trial.

B: Although "Mister LDP of Mejiro" has continually fought over the political timetable, including getting Nikaido the position of party secretary general, he has gathered 108 people together and, moreover, has made Nikaido secretary general; thus he has prepared a system which will enable him to have a dissolution whenever he wants one. All that remains is the question of when he intends to time the dissolution. Everyone, including the opposition parties, is hanging in suspense on his every breath.

A: Therefore there is the possibility that, rather than after this coming autumn, dissolution will happen unexpectedly around the time the budget is approved. With the Diet atmosphere of confrontation over an income-tax reduction, or an administrative reform, or a budget revision, there may very well be some discontented people who would say: "What a hassle!" or "Shove it!"

SHOKUN: So, when would this be?

A: This spring, around April.

D: That would be awful.(laughs)

A: In other words, it means that Kakuei Tanaka has that much power and that Zenko Suzuki the man has that close and deep a relationship with Kakuei. In addition, Suzuki and Nikaido have such a close relationship that they have been Siamese twins or identical twins. Probably even Suzuki would not go so far as to turn the nation upside down to save Kakuei Tanaka, but he will try to keep in step with Tanaka as much as possible. That's because such action would also benefit Zenko Suzuki.

B: The Suzuki cabinet has yet to consult the will of the people even once. If the will of the people, who are soverign, were to be consulted, the Fukuda faction, the Nakasone-Komoto faction, and the opposition parties would not be able to offer any opposition in the face of such a mandate.

Either Way Is the Road to Hell

A: For Zenko Suzuki, being anointed by the people would be a more certain route to reelection than a battle for the party presidency. In short, Fukuda was replaced by Ohira because he lost a stupid fight that he waged only within the LDP pond. If the Fukuda cabinet had won a general election, there would have been no need to replace a prime minister and party president who had been chosen in a general election 2 months later in an LDP presidential election. Because he stirred up a tempest in the LDP teacup, Fukuda had no choice but to bow out. If he had thrown his net wider and had sought a fight in the ocean of a general election, he would have stayed in power for another 2 years.

Zenko Suzuki likewise is not 100 percent sure of reelection, and because his reelection is doubtful without the cooperation of Kakuei Tanaka, he should follow a line that is in accordance with the wishes of Tanaka. Should he go for a general election, or should he choose a presidential election within the party? Whichever route he chooses is a road to hell. However, I think he will choose the more certain route.

SHOKUN: So you're saying he will choose a general election?

A: I think so. Suzuki's true desire is to call for dissolution in as natural a way possible, and in a situation unrelated to the Lockheed trial. This is also the strategy of the Tanaka faction.

B: If this is done in a clumsy fashion, the opposition parties will attack, calling it a "dissolution to cover up Lockheed."

A: Nevertheless, if it comes to there being no time for a natural way, Mejiro will use brute force to bring about a dissolution.

D: However, even though 108 people have been brought together and Nikaido has been made secretary general, obtaining a dissolution will still require sound justification.

A: There are any number of sound justifications lying around. (laughs) One never knows when an accident might happen. That's the reason for living in the political world.

B: Suzuki wants to have a dissolution on an occasion unrelated to Lockheed, while Tanaka wants to have a dissolution just prior to the prosecution's argument and call for punishment, so as to lengthen the period of his "struggle."

A: In boxing terms, he wants to gamble on fighting in the later rounds.

SHOKUN: In the Lockheed trial, the testimony on his receiving money has ended, and the trial probably will turn now into a battle over the issue of a prime minister's official jurisdiction. According to today's newspapers, however, the debate over official jurisdiction is going to be postponed due to the need for further preparation.

A: That's what we have been saying since last year. The mass media said that Tanaka's strategy is to have the trial end quickly and then to eliminate the remaining symptoms as quickly as possible. However, that is a mistake on the part of the mass media.

Dissolution in Order To Escape Lockheed Verdict

SHOKUN: In our last session, somebody said this: Kakuei Tanaka gathered 108 people together and made Nikaido secretary general because, when the verdict appears as guilty, the opposition parties will submit a resolution calling on Tanaka to resign from the Diet. When that happens, the LDP, arguing over this, will break up in a so-called "Kakuei split." When that happens, he will

have Nikaido put the party back in order, with the support of his 108 people. Somebody explained the situation's significance in that light.

A: If it can be done, the dissolution and general election will probably take place before that happens. Even if a resolution appeared calling for his resignation, however, it would be shelved in the Diet Steering Committee and, as in the cases of questioning Daisaku Ikeda and Kenji Miyamoto, it would never take place. It would be interesting, however, if the mass media were to take a poll of all the members of the Diet to find out whether they supported or opposed the idea.

C: The hidden Tanaka faction people would all surface, and the pro-Tanaka and anti-Tanaka groups would be clearly identified.

SHOKUN: Who would submit the call for Tanaka's resignation?

B: Probably the Japan Socialist Party.

SHOKUN: If the Steering Committee quashed the resolution, and if the mass media then took a poll, what would be the response of the LDP Diet members?

D: The majority would reply: "No comment."

C: As for me, if such a poll were taken, I probably would have to say I supported it. Politics is not such that it would improve with the arrest of that one old guy, but crime deserves punishment, so it probably can't be helped.

B: If a resolution calling for his resignation were to appear, the one most shocked by it would be Tanaka himself. That's because there already are restrictions on his activities in the official sphere. As for the case of Daisaku Ikeda, he is now confined by a mass media campaign. They're like a kind of jailkeeper. There's the danger that Kakuei will be jumped on under the same conditions. The only one who will be able to command authority at that time will be Nikaido.

SHOKUN: A little while earlier, there was talk of the possibility of dissolution in April: Are there a lot of people who believe this?

A: In both the ruling and opposition parties, almost everyone thinks that it would not be an unusual political development, were a dissolution to take place anytime after April.

B: It depends on Tanaka's intentions.

A: A dissolution in autumn would not be a natural dissolution, and probably would be a staged dissolution. It would be called a "dissolution to escape the Lockheed verdict." However, if it took place around April, it would be a dissolution not necessarily linked to the Lockheed situation.

SHOKUN: What would be the justification for a dissolution after the budget had been adopted?

A: It could be justified in any number of ways. For example, overturning one table in the conference of the ruling and opposition parties' policy committee chairmen would justify dissolution. Calling the Prime Minister a "fool" would justify dissolution. (laughs)

It Has Come Down to "Balancing Accounts"

B: For some reason, when the new year began, everyone seemed ready to run away. Such an atmosphere serves to help Tanaka. Without a doubt, there will be a dissolution. If everyone looks the other way, however, everyone will be able to serve out his term in office. Therefore, even though no one dances unless Tanaka plays the music, I wonder whether they will go along with the mood being created by the Tanaka faction?

C: Even the opposition parties, for some reason, have taken it seriously and are ready for a fight. They give the impression of tremblingly holding aloft their swords (laughs), and saying: "Come on! Come on! You enemy of my parents!" They do this even though there is great danger of their being killed by the enemy they pursue. As a result, everyone is helping Kakuei Tanaka's "Lockheed verdict coverup." Everyone is cooperating in his fight over the timetable.

SHOKUN: Usually, Diet members would rather not have a dissolution and general elections if they can be avoided. Right? The double elections were in June the year before last, so they will have been in office a full 2 years come June. Even though there is still plenty of time left before the end of their term, why is there a feeling that there must be a dissolution?

A: As one might expect, it is because the Diet is influenced by both internal and external factors. Those who now wear Diet member ID badges think, of course, that they would like to be there as long as possible, and that it would be best not to dissolve the Diet. However, there are large groups of people who have lost elections and people who want to be elected for the first time, and they are waiting for dissolution to happen as quickly as possible. They're getting cold waiting outside, and it's time to let them in; it's time for player substitutions! (laughs) These people gradually begin to make a move, and when that happens, those in the Diet begin to feel as if a fire had been lit under their seats. (Laughs)

B. Just have Kakuei Tanaka, or even someone of the status of Nikaido or Noboru Takeshita, take Saturday and Sunday and go speaking around the country two or three times. Suddenly, those in the Diet will all be in the mood for dissolution. When that happens, even the Prime Minister or Takeo Fukuda won't be able to stop it. This is because, if they go to one person's place to give him support, everybody in that prefecture will say that this means dissolution, that this means war--and they will quickly get in the mood to prepare for battle.

SHOKUN: This changes the subject, but what's happening with the so-called administrative reforms?

D: There is a strong possibility now that ultimately things will come to the point where Doko, chairman of the Ad Hoc Commission, will let loose with a letter of resignation and leave. As can be seen in the differences over economic policy between Finance Minister Watanabe and Economic Planning Agency Director General Komoto, the lack of unity within the cabinet has already been revealed. Komoto is making his pet argument that, while administrative reform should not be dropped in favor of measures to counter the recession, if such countermeasures are not taken, fiscal rehabilitation will not be possible. Ultimately, however, both Komoto and Watanabe are forgetting about administrative reform. In the beginning, it was administrative reform, but it became fiscal reform without anyone's being aware of it. Now, fiscal rehabilitation alone has become the most important topic. In short, they are concerned totally from beginning to end with adding up the Finance Ministry's figures or with balancing the accounts. Such issues as how to solve the so-called decline in administrative services, what to do about the National Railways, what to do about the food surplus programs, and how to cut out the unnecessary parts of government have all been put somewhere and forgotten.

B: The issue of reducing personnel and reducing bureaucracy also has disappeared somewhere. Instead, it has all turned into a matter of balancing accounts rather than of reducing expenditures.

C: That's why policy contradictions have appeared. Therefore, no matter when the trigger is pulled, there are factors that could greatly upset the political situation, and these are not limited to dissolution or to the results of the Lockheed trail. Such factors do exist.

Things Will Move After the Budget Is Approved

D: Because Zenko Suzuki has staked his political life on administrative reform, he will have to eat his words if that does not happen. Looking at the timetable, therefore, when will the opposition parties start moving toward thinking that the time has come for him to eat his words?

C: This could come as early as mid-March.

A: However, both the ruling and the opposition parties have the problem of business conditions and the problem of the nation's economy, so they cannot try anything risky like dissolution in February or March. For better of for worse, the budget will be approved within the fiscal year, and then the political maneuverings will start in earnest.

B. At this rate, if a revenue shortfall develops because of the zero ceiling provision, a whole batch of government bonds will have to be issued again. If that happens, the question will be raised again that it might have been better to bravely reduce taxes by even 1 trillion yen in order to stimulate the economy and to seek increased revenues from that.

SHOKUN: Is the government bond deficit now 80 trillion yen?

B: Yes. Up until recently, it was said to be some 60 trillion yen. Therefore, each and every person, including newborn infants, bears the responsibility for 600,000-700,000 yen in debts. The average household each bears the burden of 2.5 million yen in debts. Something has to be done about this national debt. However, if public works get zero, and this gets zero, and that gets zero, then there will be nothing at all in increased revenues.

D: My wife and father often purchase government bonds, but are they safe? (laughs)

B: They are patriots, aren't they? (laughs) Although this has not been studied too carefully, there have been no cases in the past in which government bonds have been turned in for their cash value.

C: Since the Meiji government, government bonds were issued in considerable quantities at the time of both the Russo-Japanese War and the Pacific War. Historically, however, these have been turned into scrap paper more often than not. Is that not right? Certainly there have been almost no cases of these having been turned in.

The Diet With a New Year's Hangover

SHOKUN: For the Diet member, is New Year's time a time for gathering votes?

D: It's a crazy time.

C: You shouldn't talk about that here. Really! (laughs)

B: That's because New Year's time is a time for working away from home so much that it's just as though the Obon and New Year's holidays came at the same time. Industries' New Year's parties and the drinking parties of every kind or organization--gatherings of 100 to 200 people--are held at this time. A meeting of 100 people at a Diet member's office usually requires a month of preparation and a total of around 1 million yen in expenditures. Because an envelope with a "New Year's present" of 10,000 or 20,000 yen suffices, we attend at all costs, even if it means going on a stretcher. One can't say one is grounded because of having drunk too much New Year's liquor, or that one is off flying a kite, or even that one is in Hawaii on the only vacation of the year.

A: Well, it's not the same as Yoshitsune's feat of leaping over eight boats, but it's like being in the East today and in the West tomorrow. By consuming it several tens of times, the next one comes easier. It's like winter Sumo wrestling practice, so the legs get in shape. (laughs) It's like self-training in pro baseball. (laughs) Those that don't do it, don't make out very well once the season starts.

SHOKUN: You do some 10 places in your own electoral district:

A: That's right. On really terrible occasions, you might have to manage 20 New Year's parties in one day.

B: Somebody drunk on sake might say to you: "You! Won't you take a drink of my sake? When and how did you ever become a Diet member?" (laughs) Then, you become his drunk companion, saying: "Yes. Yes. Thanks for the feast." (laughs)

C: Even if you exchange toasts with only half a hundred people, it's way too much.

A: Therefore, you put your head and your heart away in a safe place, and only your body, given over to drink, staggers over here and over there. It's like a dead spirit offering up liquor. (laughs)

C: If, for example, it takes 60,000 votes to be elected, that means 60 meetings of 100 people each.

B: If your stomach and your liver aren't strong, you can't do it. (laughs)

A: Everyone is showing the initial symptoms of hardening of the liver.

C: Look at my hand. Have any spots appeared? (laughs)

D: If you think about it, this is not something a human being should be doing. This business.

A: If you go to the Diet after the New Year's holidays are over, everyone has a yellow-colored face. (laughs) Even the whites of their eyes have become yellow. Everyone is in a daze because of the New Year's holidays.

B: Like Rokusuke Tanaka, therefore, they blurt out things they shouldn't.

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POLITICAL AND SOCIOLOGICAL

LDP'S POLITICAL GADFLY NAKAGAWA DISCUSSED

Tokyo THE DAILY YOMIURI in English 16 Apr 82 p 3

[Article by Kenji Kitahara]

[Text] The political situation, which was a short time ago highly stable, is showing signs of possible upheavals because of revenue shortfalls in fiscal 1981, providing tempting opportunities for a political gadfly.

Some difficulties such as verdicts in the Lockheed bribery trials lie in the path of Prime Minister Suzuki's campaign to win reelection as president of the Liberal-Democratic Party (LDP) next November.

But Suzuki must pay careful attention to Ichiro Nakagawa, director-general of the Science and Technology Agency.

Nakagawa once absented himself from a Diet session and criticized Suzuki over the F4 fighter-interceptor remodeling issue.

Nakagawa is not really a direct political threat to Suzuki. His faction is not as large as the one led by former premier Fukuda, who is discontented with the Suzuki administration, or the one headed by Economic Planning Agency Director-General Toshio Komoto, who is aiming to become the leader of the LDP.

Rather Nakagawa is feared because he is a "provocateur" in the political world and is extremely energetic.

He is well known for his advocacy of the theory of a "bipartisan conservative regime." He tried once to form a new conservative party with Komoto as president on the occasion of the twin elections in 1980.

Nakagawa is intimate enough with Ikko Kasuga, former chairman of the Democratic- Socialist Party (DSP), to call him his "comrade."

It is believed that Nakagawa is plotting to jolt the Suzuki administration in concert with politicians inside and outside the LDP.

Nakagawa and his associates are reported to be preparing for a merger of the Komoto, Fukuda and independent factions of the LDP and the right wing of the Socialist Party (JSP).

Of course, it is improbable that Fukuda and Komoto would back such as drastic political realignment.

But those close to Suzuki and the faction led by former premier Kakuei Tanaka are nevertheless cautiously watching Nakagawa.

Recently Nakagawa often says that he will take the lead in any action since Komoto cannot do this easily. This has led to speculation that Nakagawa will try to disturb the political situation at every opportunity.

In this political situation, the mainstream factions believe they can predict how Komoto and Fukuda will behave by observing the actions of Nakagawa and Shintaro Ishihara, former director-general of the Environment Agency, who is close to Nakagawa

What sets Nakagawa apart from other politicians is his intense vitality and his actions which sometimes seem to lack political sense.

International Trade and Industry Minister Shintaro Abe, who is also is considered a "new leader" of the LDP, is reported to be advising Nakagawa to be patient and wait until the time is ripe for action.

There is no doubt that Premier Suzuki and also some of Nakagawa's supporters are nervously waiting to see what Nakagawa will do next.

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POLITICAL AND SOCIOLOGICAL

KEIDANREN'S RECOMMENDATION FOR ADMINISTRATIVE REFORM EDITORIALIZED

Tokyo MAINICHI DAILY NEWS in English 19 Apr 82 p 2

[Editorial]

[Text]

The Federation of Economic Organizations (Keidanren) recently filed a recommendation with the Second Ad Hoc Council on Administrative Reform in an apparent gesture of shoring up the council from the standpoint of the nation's industries.

The gist of the recommendation calls for 1) adherence to the basic target designed to discontinue the flotation of deficit-covering national bonds in fiscal 1984, 2) carrying out a thoroughgoing review of expenditures, 3) no more tax increases, 4) the establishment of a minus ceiling in the compilation of the fiscal 1983 national budget, 5) a review of the subsidy system, and 6) adjustment or abolition of various approval and licensing systems.

In fact, the recommendation is designed to realize the oft-publicized "small government" concept and boost "the vitality of the private sector."

The majority opinions in economic circles are summarized in the recommendation, and there is little doubt that it aims to extend support to President Toshio Doko of the Council, who is the honorary president of the all-powerful Keidanren. In a sense, the nation's economic world picked him for the present post and is obligated to support him wholeheartedly.

The recommendation emphasizes that the purpose of administrative reform is to delve into the highly inflated administrative systems of both the central and local governments and realize a simplified, effective government, ease the tax burden on the people, and repel all moves that run counter to the goal of the council, such as a tax increase. As a matter or principle, there is nothing wrong with their argument. On the other hand, however, we must

question them as to their true intent concerning what they call administrative reform. What do they actually hope to gain by the proposed reform?

To begin with, the recommendation smacks highly of the "philosophy of patience" advocated by President Yoshihiro Inayama of Keidanren. His concept is supported by most of the top leaders in the nation's economic world. Under the circumstances it is feared that only the masses will be compelled to exercise patience.

Fiscal reconstruction without a tax increase has long been a catchphrase of financial circles. As the income tax cut was shelved this year, workers have to virtually pay higher taxes. The financial world appears to be quite indifferent to this reality. As such, they may have no excuse to offer, even for the criticism that fiscal reconstruction without a tax increase is nothing more than "fiscal reconstruction without an increase in corporate taxes."

Secondly, the recommendation insisted that expenditures should be reviewed from the ground up, but it failed to touch on "increased defense spending" which caused a controversy in the Diet discussions on the fiscal 1982 budget. Why did they remain silent about this all-important issue?

President Inayama has often stated that defense and welfare should be dealt with separately, meaning that preference should be given to defense spending while applying the brake on welfare policies. His view is gaining strength among the top echelon of the financial circles.

The defense production subcommittee of Keidanren, made up of arms manufacturers, earlier submitted a request to the government and the Liberal-Democratic Party calling for an increase in expenses for the research and development of arms and other related items. Financial circles are definitely in favor of promoting arms expansion, but how can they make it compatible with a recommendation which calls for a thorough review of expenditures?

We are fully in accord with the idea of strengthening "the vitality of the private sector," but as we have already pointed out, a militarization of the economy through the promotion of arms expansion will, in the long run, destroy the vitality of that sector.

We can hardly take sides with the fiscal and administrative reforms proposed by the financial circles if they are to give preferential treatment to the defense buildup at the sacrifice of welfare. The administrative and fiscal reforms must be pushed forward hand in hand with the masses. No reform is possible without the participation of the entire nation.

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POLITICAL AND SOCIOLOGICAL

SUZUKI GOVERNMENT'S POLICY REVISION PREDICTED

Tokyo MAINICHI DAILY NEWS in English 21 Apr 82 p 2

[Nagatacho Doings column by Takehiko Takahashi: "Basic Revision of Economic and Financial Policies?"]

[Text]

The Second Ad Hoc Council for Administrative Reform will submit its basic recommendations at the end of July. At that time the government will probably find it necessary to take up a basic revision of economic and financial policies.

The tax revenue shortage in fiscal year 1981 is likely to be between 2,283,300 million yen and 2,590,000 million. Moreover, it is predicted that if the present economic conditions continue, the shortage in tax revenue in fiscal year 1982 also may amount to 3 trillion yen (some say 4 trillion yen).

Then for fiscal year 1983, as against preliminary calculations of the public financial balance, which the government has already carried out, a tax shortage of 2,900,000 million to 5 trillion yen is foreseen.

As can be seen from these figures, the government has been pushed into a very painful financial situation because of the tax revenue shortage. No effective measures for overcoming this situation are in sight.

It is at such a time that Prime Minister Zenko Suzuki is proclaiming "rehabilitation of public finances without a tax increase."

This means that without increasing either direct taxes or indirect taxes, the budget will be compiled without the issuance of special bonds (red-ink national bonds). The general view is that this is impossible under the present situation.

If Prime Minister Suzuki's intention is to be carried out, expenses (government expenditures) must be slashed to correspond with the shortage in tax revenue. This is being strongly demanded by Chairman Toshiwo Doko of the Ad Hoc Council.

Foreseen Long Ago

Chairman Doko says, "the government has not done anything about the administration that became bloated during the period of high economic growth — it is strange for it to be saying now that there is a shortage in tax

revenue. This situation could have been foreseen long ago."

The government's attitude is being severely criticized by Doko. He adds that "it is only natural for the fiscal '83 budget to be drafted with a minus ceiling."

Chairman Doko also opposes the view that business should be given priority over administrative reform.

After the shortage in tax revenue became definite, Finance Minister Michio Watanabe called on former Prime Minister Takeo Fukuda.

Fukuda served long in the Finance Ministry. He is an economic and financial expert with experience as finance minister and prime minister. It is believed that Fukuda's way of thinking is as follows:

1. There is a lack of understanding of the world economy. Japan today has left the period of high and medium growth, and is in a period of low growth. This is only natural in view of the current world economy.

2. There is a need to restudy the Seven-Year Economic Plan. This plan anticipated a 5.5 percent growth. At this time when a 3 percent growth is about the best that can be expected, it is a mistake to have this kind of a medium-growth plan.

3. Accordingly, Japan's financial and economic policy must begin by correcting the irregularities at the starting point. At such a time, it is a political mistake to promise a tax reduction.

Director General Yasuhiro Nakasone of the Administrative Management Agency is waiting for the basic recommendations of the Ad Hoc Council. He seems to be desirous of carrying out policies positively as soon as the basic recommendations are received. It is most likely that the Second Ad Hoc Council for Administrative Reform will adhere to the principle of "rehabilitation of public finances without tax increases." This seems to be from the consideration that the work cannot be done unless both the "entrance" and the "exit" are blocked.

At meetings of the Komoto faction, Director General Toshio Komoto has shown a cautious attitude toward a conversion of policies. This is probably because he does not want to mar Prime Minister Suzuki's slogan of "rehabilitation of public finance without a tax increase."

Notwithstanding, when the basic recommendations of the Ad Hoc Council are presented and work starts on the formulation of the fiscal year 1983 budget, the shortages of not only fiscal years 1981 and 1982 but also for FY'83 will become clear. There is strong probability of an emergency Diet session being summoned for approval of a supplementary budget.

Prime Minister Suzuki will most likely face the need for a broad revision of the political and governmental policies carried out up to now. Here again there is a strong possibility of this becoming linked with a "great political confusion" that will shake the Suzuki administration.

(The writer is an adviser to the Mainichi Newspapers and former chief editorial writer).

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ECONOMIC

'MAINICHI' URGES OPENING JAPAN'S FARM MARKET

OW220941 Tokyo MAINICHI DAILY NEWS in English 21 Apr 82 p 2

[Editorial: "Farm Produce Imports"]

[Text] Japan and the United States have suspended talks in Washington, D.C. on Japanese imports of American farm products due to a difference of views on Japan's import liberalization of 22 agricultural products. Japan insists that the two countries should seek a solution on a step-by-step basis but the United States adheres to the view that Japan should completely liberalize the import of 22 items and if not, the two countries should try to settle the matter through consultation as stipulated in article 22 of the General Agreement on Tariffs and Trade (GATT).

As a result, the two countries will continue talks under the new formula. It seems there is little substantial difference because the two countries will continue negotiations. The second paragraph of article 22 reads: "The contracting parties may, at the request of a contracting party, consult with any contracting party or parties in respect of any matter for which it has not been possible to find a satisfactory solution through consultation..."

Japan can no longer satisfy the United States merely through reducing the number of import restrictions on farm products. The failure of the Washington meeting indicates that Japan must take another good look at its liberalization policy.

Japanese consumers who have been suffering from a gradual decline in real income complain about the high prices of imported agricultural goods. We do not think that liberalization would be a panacea for the disputes, nevertheless the government must deal with the matter after reexamining its unyielding protectionist policy. We hope that the government will demonstrate determination to open the domestic market to foreign farm and other products when it announces its open market measures in early May.

The Washington talks collapsed because of failure to narrow their difference of views. Japan said that it has been the most stable market in the world for foreign farm products and proposed that the import of beef and oranges from the U.S. should be further studied through bilateral meetings. Japan also reiterated that it is the biggest customer of American agricultural products and that an expansion of imports would thus help U.S. farmers.

To this, the U.S. complained that farm products symbolize the closed nature of the Japanese market and that Japanese "protectionism" should be considered a "matter affecting the operation of this (GATT) agreement."

The U.S. turned a deaf ear to Japanese claims and proposed to continue the talks on a qualitatively different level by applying the "consultation" formula under the GATT, revealing U.S. irritation and discontent with Japanese policy.

We would like to point out, however, that the U.S. itself is not necessarily a faithful follower of the GATT. Only refined sugar is on the American residual import restriction list but the U.S. still enjoys the "waiver of obligations" in the liberalization of 13 goods including milk, cream and butter, thus offending the Netherlands.

The European Community also maintains some measures to protect regional agricultural production, and it can be said that every nation protects its agricultural sector in one form or other. But claims and counterclaims are not a reasonable way to find a solution.

We believe that both Japan and the United States must try to reach an agreement by putting aside their own theories. The U.S. wants to see Japanese liberalization of two particular items out of 22--beef and oranges. We understand that a complete liberalization of beef and oranges would not benefit the U.S. because they are less competitive than Australian beef and Brazilian oranges in the international market.

Japan must remember that it has enjoyed the merit of liberalizing manufactured products under the GATT. We hope that officials concerned will formulate annual liberalization programs by giving up the idea that manufacturing industries should progress at the sacrifice of agriculture.

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ECONOMIC

U.S. PLANS TO TAKE FARM PRODUCE ISSUE TO GATT

OW181126 Tokyo ASAHI EVENING NEWS in English 16 Apr 82 p 5

[ASAHI SHIMBUN 15 April editorial: "Farm Products and GATT"]

[Text] The issue of Japan's residual restrictions on imports of 22 agricultural products, which has been discussed at a working-level conference in Washington, will now be brought by the Americans for review to the General Agreement on Tariffs and Trade (GATT). So these residual import restrictions will be brought before an international forum for debate, and this will probably bring about a new phase of agricultural product deregulation for Japan.

During the recent U.S.-Japan talks in Washington, the Japanese side explained that further trade liberalization for agricultural products would be difficult and pointed out that the United States also maintains import restrictions of its own on various items. Understanding was sought on these points, but the United States refused to change its position that Japan's residual import restrictions violate article 11 of GATT which places a general prohibition on quantitative import restrictions.

After hearing Japan's response, the United States will make a formal proposal to hold discussions on the basis of article 22 of GATT. In turning down Japan's proposal that the residual import restrictions should be allowed to stand while both sides seek a compromise, the United States has ensured that future debate will be focused on the relationship between GATT and the residual import restrictions. According to article 22 of GATT, other countries that have an interest in the matter may participate in the discussions to hlep the two sides reach an agreement. Japan will be in a much weaker position than in purely bilateral talks with the United States.

Even if a compromise is reached between Japan and the United States, it is unlikely to last very long if the agreement is ad hoc and not accepted internationally. If U.S.-Japan trade friction grows again, the United States will almost certainly demand a review of any compromise that is reached between the two countries.

It is very significant that Japan should review its residual import restrictions in accordance with the international rules of GATT at a time when the

dispute about these restrictions has reached such a stage that it is being taken to GATT. Though opposition is expected from farmers, it seems that there is no escape for Japan. It is only natural, therefore, that the Ministry of Agriculture, Forestry and Fisheries should have decided to approach the GATT consultation in a positive manner.

GATT contains special provisions that authorize import restrictions when domestic production adjustments are being made in specific industries in a country. There is now a surplus in the production of most of Japan's principal agricultural products. In view of this situation and the fact that Japan has a low self-sufficiency rate for food--72 percent with respect to the total and 33 percent with respect to grain, it can be very strongly argued that Japan's market is by no means unreasonably closed to agricultural imports.

Japan, whose agriculture is relatively backward, cannot accept the fact that advanced agricultural countries in Western Europe and the United States have been given formal approval for import restrictions that are no different from Japan's. In addition, many people doubt whether trade in agricultural products, which are influenced by geographic and climatic factors, should be treated like industrial products.

If Japan's case is brought to GATT, Japan may have to make some concessions with regard to the liberalization of the market or the expansion of import quotas. It should adopt policies that conform to international rules, while taking appropriate steps to see that the basis of its agriculture is not destroyed.

Some people argue that, to prevent the United States from involving GATT in these questions, Japan should announce a dramatic plan for agricultural liberalization as the second plank of the policy for handling trade friction that is to be launched before the June summit of the leaders of the advanced nations. But real solutions cannot be found by means of generalized discussion on the political level, and if Japan yields to the United States, it may invite reactions from other agricultural countries.

Even if progress is made toward agricultural liberalization, it may not lead to a basic solution of the trade discord. Without measures to encourage the orderly export of manufactured goods and the stimulation of domestic demand, which should be taken in conjunction with measures to reduce working hours and improve living standards, there will be no end to the friction. A way of dealing with agricultural products should be considered within the context of a comprehensive trade policy.

CSO: 4120/253

ECONOMIC

SALE OF ALASKAN CRUDE OIL TO JAPAN WOULD HELP U.S.

Tokyo SHUKAN ASAHI in Japanese 19 Mar 82 pp 27-29

[Article by staff reporter Yukimasa Okamoto: "'Japanese-U.S. Trade Friction Is Pure Fiction!?': Both Sides Avoid Alaskan Crude Oil Importation Issue"]

[Text] Even if one is to judge it from a sympathetic standpoint, the United States' argument in the current Japan-U.S. trade negotiations does seem unreasonable in many respects.

For example, let us take the issue of beef, which is thought to symbolize Japan's protectionist policy. The price of beef is indeed very high. So the Ministry of International Trade and Industry's [MITI] argument that "with regard to beef, the United States is far more restrictive" does have less credibility than that advanced by the United States. But, if imports are deregulated, what would flow in would be Australian beef. And if, as a result of that, Japanese dairy farmers go bankrupt, there will be a reduction in feed imports from the United States and the United States may very likely be the loser. This is also true with respect to oranges.

"If orange imports are deregulated, Israeli varieties would come in; juice would be Brazilian." (economic commentator Keitaro Hasegawa) The U.S. position is indeed very insecure.

In spite of the U.S. Government's haughty demand that "dramatic action is needed" or that "it (the United States) would not hesitate to report Japan's trade barriers as violations of the General Agreement on Tariffs and Trade," the prominent opinion in Japan is that, "regardless of how we rework the tariff list, the change in trade revenue would be in the $700-to $800-million range." (Noboru Makino, Mitsubishi Comprehensive Research Institute president) But perhaps the United States is well aware of these things.

Last year, the U.S. trade balance was $39.7 billion in the red. Of this amount, more than 18 billion was owed to Japan. Thus it is understandable that the United States is asking Japan to "do something."

What should then be the course of action for Japan? At this juncture, the Alaska crude oil issue surfaces. Both Makino and Hasegawa claim: "All would be well if we could buy Alaskan crude oil from the United States."

The reason is crystal clear. Japan's crude oil import [bill] for 1980 was 13.64 trillion yen. A phenomenal 43.4 percent of Japan's total imports is taken up by payments for petroleum. Import volume per day is approximately 4 million barrels. One barrel is about 159 liters, so [the daily import volume] comes to 636,000 kiloliters.

"If 10 percent of this amount could be imported from the United States at the rate of $30 a barrel, the 'purchase' would be $4.4 billion a year. There can be no other 'dramatic solution' for improving U.S.-Japan trade relations." (Hasegawa)

This idea gives us the hope of killing not merely two but three or four birds with one stone. At present, nearly 70 percent of Japan's crude oil imports come from Middle Eastern states--half of it from Saudi Arabia.

The need for diversifying the sources of petroleum supply in order to ensure a stable economy has been discussed since the oil shock crisis. Having the United States supply crude oil would contribute significantly toward stabilizing the Japanese economy.

Next is its effect on the OPEC nations' crude price of oil. As a result of the unexpectedly speedy spread of energy conservation measures and the implementation of energy source conversions in the developed countries, there is now a surplus of crude oil--some say that it is "as much as 2 million barrels a day." Although the "$40-a-barrel era" was heralded at the OPEC meeting in Bali toward the end of 1980, that price was short-lived, and the "spot" market price recently has been as low as $20. Now, if "prime customer" Japan were to shift a significant volume of its purchase order to another supplier, the OPEC price would decline further.

Moreover, there is the additional merit of cheaper transportation costs. The tanker route from Saudi Arabia's shipment point, Ra's at-Tannurah, to Yokohama is 10,600 kilometers. From the Alaskan shipping point of Valdez, the distance requirement would be cut almost in half--a little less than 5,500 kilometers.

Exchange-of Exports Involving Mexican Crude Oil

If there are these advantages, why isn't it being done? The truth of the matter is that, ironically, U.S. "trade barriers" are impeding its realization. Exports of U.S. crude oil are forbidden on principle under the "Export Control Act" and the "Alaska Pipeline Act."

Alaskan crude oil was discovered in 1968 in the North Slope area facing the Arctic Ocean. It is transported to the ice-free port of Valdez, located east of Anchorage, via a pipeline 1,300 kilometers long.

Production volume at present is 1.6 million barrels per day. This is more than the West Coast can use, and so nearly 40 percent is shipped to the East Coast via the Panama Canal. The Valdez-Los Angeles route is approximately 3,300 kilometers, but shipment to Boston on the East Coast means a travel distance of 11,500 kilometers--farther than from Saudi Arabia to Yokohama.

Then there is the consideration of the Panama Canal use fee; furthermore, in order to ship crude oil through the Canal, it has to be transferred to a 60,000-ton-class tanker. For these reasons, export of Alaskan crude oil to Japan has been under consideration since the start of production.

The portion sent to Japan can be made up by importing from closer Mexico; thus maintaining the existing balance. At present, Japan is slated to receive 300,000 barrels per day of crude oil from Mexico, but this crude oil travels 25,500 kilometers after it leaves (Paiaritos), the Mexican port of shipment on the Gulf of Mexico side, passing Cape Town and going through the Indian Ocean. Starting in April, the shipment will depart from the Pacific Ocean port of Salina Cruz, but even then the route to Yokohama requires over 10,000 kilometers. It would be most cost effective if Mexican crude oil were transported to the U.S. East Coast and an equivalent volume of Alaskan crude oil were shifted to Japan.

Three years ago, President Carter seriously considered this alternative, because "it would mean savings in transportation costs and because it would improve the U.S. balance of trade and moreover strengthen U.S. ties with Mexico." A Japanese-U.S. conference of eminent personages [kenjin], in a report published in January last year, stated that "exporting Alaskan crude oil to Japan or swapping exports with Mexican crude oil" would be an important symbolic demonstration of Japanese-U.S. cooperation, would stabilize Japan's petroleum supply, and would remedy the U.S.-Japan trade imbalance as well as effect savings in transportation costs.

Moreover, the head of the largest U.S. independent petroleum firm--Atlantic Richfield Corporation's Board Chairman Anderson--also wants Alaskan crude oil to be exported to Japan. The "Japan Energy-Related Special Council" (the U.S. counterpart is the "Pacific Conference Energy Policy Council"), made up of industrialists and academicians from Japan and the United States, enumerated in its joint report, compiled in June of last year, the merits of making Alaskan crude oil available to Japan.

Against this backdrop, it is reported that last autumn the Reagan administration did consider the lifting of the ban on Alaskan oil exports to Japan, and that the White House Policy Council had "OK'd" it.

But as a result of tension in the Middle East caused by the assassination of Egyptian President Sadat, there was a 180-degree aboutface in policy. In November, the U.S. Government's Presidential Council on Natural Resources and Environment, in a seven-to-three decision, rejected the lifting of the ban on Alaskan crude oil exports.

Now that the tension in the Middle East has eased once again, it would not be inappropriate to resume import talks, but the topic has been all but forgotten. Why? Mr Hasegawa states: "The Japanese-U.S. trade friction is pure fiction. It is as if the two governments were wrestling with a ghost."

On the U.S. side, the politicians are looking for popularity points for the upcoming midterm election in the fall. Their stance is consistent. The basis

for the dissatisfaction with Japan is the poor state of the U.S. economy, symbolized by an unemployment figure of over 10 million. This is directly tied to their political responsibility. But their scheme is to let Japan shoulder the blame--to channel the electorate's dissatisfaction toward Japan.

As mentioned previously, lifting the ban on exports of Alaskan crude oil to Japan would have a "dramatic" impact on the trade revenue figures; its effects on the voters, however, would be entirely negative--a decline in U.S. oil refinery operations, decreased business for the tanker industry, and so on. Therefore, old stories such as "crude oil exports would endanger U.S. security," or "disuse of the Canal would wreck the bonds of friendship between the United States and Panama," are still being paraded.

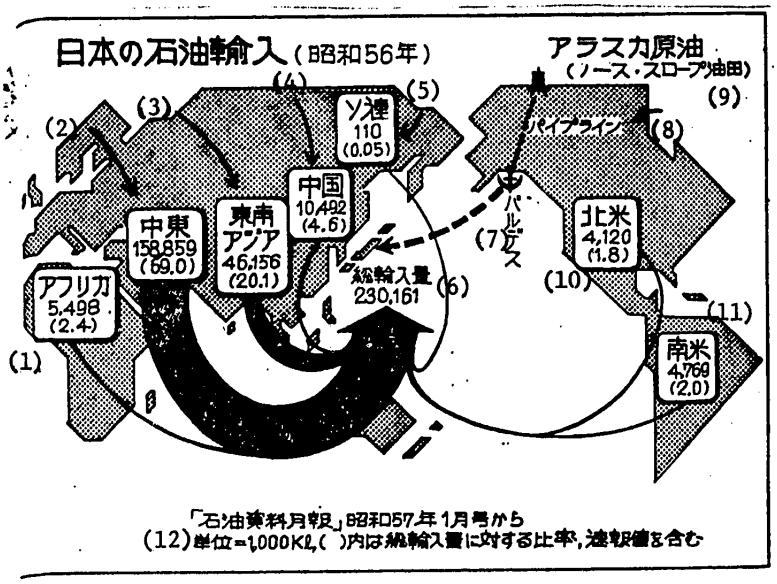
Mr Makino says: "It would be significant [for Japan] to press for repeal of the the ban on Alaskan crude oil exports. It would indeed be counter-PR. If it were to get results, all the better."

But up to now, Japan has not wanted to play this "trump card" up front.

Today, when there is more than enough oil in the world, the lure of Alaskan crude oil is not very attractive to the petroleum industry. Alaskan oil has a sulfur content of 1.04 percent. It is extra-heavy oil. Whereas 24-25 percent can be extracted from Saudi Arabian oil for gasoline, a little more than 10 percent is all that can be squeezed out of Alaskan crude oil. The MITI claims that in the current U.S.-Japan trade negotiations, the Agency of Natural Resources and Energy, acting on cue from the domestic petroleum industry, is privately opposing the "Alaskan crude oil importation proposal."

Thus, while the trump card--the Alaskan crude oil issue--is being ignored, the friction between the United States and Japan seems on the surface to be gaining in intensity. Regardless of national differences, elections and politicians appear to be very much alike everywhere.

Japan's Petroleum Imports (1981)



Key:
(1) Africa
(2) Middle East
(3) Southeast Asia
(4) China
(5) Soviet Union
(6) Total import volume
(7) Valdez
(8) Pipeline
(9) Alaskan crude oil (North Slope Oilfield)
(10) North America
(11) South America
(12) from Petroleum Resource Monthly, Jan 82
unit = 1000 kℓ
( ) enclosure represents percent in relation to total import volume, including sokuho-ne [rapid dispatch value]

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SCIENCE AND TECHNOLOGY

HITACHI SELLS SEMICONDUCTOR TECHNOLOGY TO HEWLETT-PACKARD

Contract on 64K DRAM

Tokyo NIHON KOGYO SHIMBUN in Japanese 3 Mar 82 p 2

[Text] Hitachi, Ltd (president, Mita Katsushige) on the 2d announced the conclusion of a concrete agreement with the American specialist electronics manufacturer HP (Hewlett-Packard) to contract for the sale of technology concerning its advanced memory product, the 64K DRAM.

As far as Japanese manufacturers providing American companies with IC technology is concerned, up to now, outside of the discussions in progress between Mitsubishi Electric Corporation and Westinghouse, there have been a few examples involving small to medium-sized in-house manufacturers, but this is the first instance of a firm agreement involving advanced products or a large specialist electronics manufacturer like HP.

American interest in semiconductor trade with Japan is focused upon the 64K DRAM, and in this field the choice by HP of Hitachi as a partner is to be taken as showing the evaluation by American companies of all Japanese-manufactured 64K DRAM, not only those of Hitachi. Alongside its positive aspects for Japanese-American technological exchange, this will intensify the unhappiness of American semiconductor manufacturers.

The substance of the agreement for the sale of technology is that: 1) it is concerned with 64K DRAM, 2) it will include 64K DRAM mask and 3 micron N-MOS process technology, and 3) its use will be limited to HP's own products.

HP is a prominent American electronics manufacturer and produces minicomputers, instruments, medical electronic devices, and the like. It has 57,000 employees and its sales in 1981 amounted to 31 billion dollars. Recently the company has expanded its semiconductor manufacturing plant and is prepared for the manufacture of the 64K DRAM.

MITI Values Cooperation Highly--Statement of Minister of International Trade and Industry Abe

"There has long been a vigorous interchange of capital and technology between Japan and the United States in the area of semiconductors. This

instance of technological cooperation is a concrete example demonstrating the recognition in this country of the importance of further extending smooth cooperation between Japan and the United States in the field of the 64K DRAM, the most advanced semiconductor technology. MITI also values this highly. It is very much hoped that hereafter we will be able to positively encourage technical cooperation not only in the semiconductor field but in all areas of advanced technology, and be able to count upon coexistence and coprosperity between Japan and the United States in the field of advanced technology."

Second HP Shock

Tokyo NIKKAN KOGYO SHIMBUN in Japanese 3 Mar 82 p 12

[Text] Hitachi, Ltd (president, Mita Katsushige) announced on the 2d the conclusion of a firm agreement for the sale of production technology for the 64K DRAM (dynamic read-and-write memory) to the American specialist electronics manufacturer Hewlett-Packard (HP). The main points in the agreement are: 1) it concerns the 64K DRAM, 2) the offered technology is that of its mask and the 3 micron N-channel MOS process, and 3) its use will be limited to HP's own products. The contract is presently being worked out, but it is expected to be concluded soon. Once the contract is concluded, HP will manufacture 64 K memories in its recently expanded factory in the California city of Cupertino and will use them as components. For the American homeland of semiconductor technology, this will be the first import from Japanese manufacturers of this sort of basic production technology, including masks.

The sale to HP by Hitachi of technology for the 64K DRAM, the most advanced area of this technology, can be taken as important in showing that there is no hindrance to the establishment of friendly relations between companies of the two countries as a result of the growing trade friction between Japan and the United States recently in this field. The concrete reason for this is that HP, as a powerful electronics manufacturer, is known for strictness in quality control and reliability and sees that the acquisition of this technology will enhance the worldwide reputation of its own technology.

Value of Japanese-American Cooperation in Advanced Technology--Minister Abe

Minister of International Trade and Industry Abe, at a press conference after a cabinet meeting on the 2d, said concerning the fact that Hitachi Ltd has reached agreement with Hewlett-Packard for the sale of production technology for the 64K DRAM: "We highly value Japanese-American cooperation in advanced technology." He added the following.

There has long been a vigorous interchange of capital and technology between Japan and the United States in the area of semiconductors. This instance of

technological cooperation is a concrete example demonstrating that our country recognizes the importance of counting on the development of Japanese-American cooperation, coexistence and coprosperity in the field of the 64K DRAM, its most advanced area of technology. It is valued most highly.

It is now appropriate for our country to advocate setting up a joint U.S.-Japanese study group for advanced technology, and it is very much hoped that hereafter we will be able to encourage such technological cooperation not only in the field of semiconductors but in all areas of advanced technology, and that we will be able to count upon coexistence and coprosperity in the area of advanced technology.

Editorial: A Beneficial Blow for American Industry--HP Shows the Spirit of Economic Principles

Hewlett-Packard's decision to import technology related to the 64K memory from Hitachi may be considered, at this juncture when the Japan-U.S. semiconductor war is intensifying, as a strong counterpunch by the American semiconductor industry, launched by Hewlett-Packard (though with the effect of an infuriating if beneficial blow).

To the American semiconductor industry, the fact that one of its own nation's companies, which it relies upon as a major customer, should, out of necessity, rely upon an enemy company to move into this technology will, at the same time as it inflicts a blow from an ally that means that there will be no early victory in the 64K war, deliver a major shock which will have a large influence on the future conduct of the 64K war.

HP (headquartered in Palo Alto, California; company president, John A. Young) is a specialist manufacturer of minicomputers, medical electronic devices, and analytical instruments, with capital of 393 million dollars, sales of 3.1 billion dollars, and 57,000 employees (all as of October 1980). In Japan it owns a subsidiary company jointly with Jokogawa Electric Works Ltd (Yokogawa-Hewlett-Packard).

In semiconductors, HP manufacturers for its own use optoelectronics, IC, and IC for microchips. but it does not sell them outside (it does sell some special semiconductors). Its technology reaches artistic levels, as shown by its display of a 32 bit micron at last year's and this year's International Solid State Circuit Conference. As for memories, it manufacturers internally up to 16K DRAM, but the greater part are bought from outside, and it has begun to import 64K from Japanese firms.

The previous greatest shock in the Japanese-American semiconductor war was in March 1980, at a seminar held in Washington by the Electronic Industries Association of Japan, when Hewlett-Packard's Data Systems General Manager Anderson compared Japanese and American 16K memories and showed figures that the defect rate of Japanese products was one-sixth that of American products, and proved that Japanese quality control was superior. With this, attacks from the American side suddenly stopped and American companies all at once

became very concerned about quality control. At present they are claiming that this has had a big effect and that the quality of the current products is comparable to that of Japanese products. This new move may be considered the second successive "HP shock."

Criticism of Japan's excessive exports is considerable, as shown by the demand for "strong measures" made by the U.S. Government to the Esaki mission. However, HP shows the spirit of the economic principle that, however you may wish to protect the national industry, it is not permissible for an American company which is a major user of 64K memories to tie itself to Silicon Valley companies which, though probably once the most advanced, are now becoming a backward production area, to put together systems incorporating obsolete IC from them, and thereby lose competitive power even at home, let alone overseas.

That being said, it is also dangerous to be able to survive only through imports from Japanese companies. It is evident that the company has concluded that the best policy is to import technology from a top manufacturer of 64K and then manufacture them itself. In fact, IBM, Western Electric and other giant American companies already mass-produce 2-3 million or more 64K per month for their own use, and, although there are reports of the imminent manufacture of 256K, for America's large systems manufacturers the current 64K devices are urgent. In these circumstances its neighbors in Silicon Valley have announced 64K products, but after more than 2 years they have not yet been able to achieve mass production. It might be said that the feeling has developed that it cannot risk relying on these companies and going down with them.

Up to now the relationship has not involved capital or technology or anything beyond the simple purchase of memories. This present proposed cooperation is at the initiative of HP and is due to its high evaluation of Hitachi's semiconductor technology based on its previous acquisitions of 16K and 64K. The negotiations on cooperation began in the summer of last year. For HP, its own production of 64K will provide only a part of its consumption and will not mean the cessation of imports of 64K from Hitachi and other Japanese firms.

In this cooperation it is said that the sending of technicians from Hitachi and the offer of production machine knowhow go hand in hand. Up to now there has been a one-way flow of semiconductor technology from the United States to Japan, and it is clear that this offer of Hitachi technology is a remarkable event which shows a change in the direction of the flow of the export of silicon technology from Japan to the United States, at least in the most advanced fields of gallium arsenate and Josephson elements.

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SCIENCE AND TECHNOLOGY

CURRENT R&D OF FINE CERAMICS, AMORPHOUS SILICON DISCUSSED

Tokyo BUNGEI SHUNJU in Japanese Mar 82 pp 134-150

[Article by Yasunobu Misato, economic critic: "Two Leading Roles--Ceramics and Amorphous Silicon--Which Drive the Materials Revolution; an Attempt Is Being Made To Turn Man's Dream Into Reality"]

[Excerpts] Ceramic Engine Successfully Trial Manufactured

Kokubu city, approximately 25 minutes by car from Kagoshima airport, is the site of the consolidated research center and the Kokubu plant of Kyoto Ceramics Co.

Its ground, 223,000 square meters in area, is divided into four sections. In three of the four sections are 15 plant buildings, while the fourth section contains the consolidated research center. Although Kyoto Ceramics has four plant sites all over the country (Fusho and Yokaichi in Shiga Prefecture and Kawauchi and Kokubu in Kagoshima Prefecture), Kokubu is the only site a plant and an R&D department are integrated in a single location.

"We don't find any inconvenience at all. The information necessary for the research center comes mainly from the sales personnel stationed in the United States. Kyoto Ceramics International is headquartered in San Diego. Information concerning what the users want and what technology the users are interested in is forwarded to us.

"News and information from the United States is voluminous because of its huge technical background.

"Information concerning literature and patents is sent from Kyoto and Tokyo over telephone lines to our computer terminals. Probably, only the telephone billbill is higher here than it would be in a central location." (Yoshimitsu Hamano, doctor of engineering, executive director, Consolidated Research Center).

The world's first ceramic diesel engine was successfully trial manufactured here on 23 December last year, and a historic step in the R&D of ceramic products was taken. How well the ceramic diesel engine car of Kyoto Ceramics

ran was televised on 4 January this year as part of the Golden Hour program of NHK, entitled "Top Technology that Changes Japan." So, many of you must have seen it.

The ceramic engine may be described briefly as an engine which does not need water cooling, because unlike the conventional cast iron engine, the ceramic engine has much greater strength at a higher temperature. In today's gasoline engine (reciprocating engine), no more than 22-23 percent of the thermal energy released by combustion is used as driving energy. The rest of the thermal energy is lost: approximately 25 percent through the cooling water, approximately 34 percent through the exhaust gas (and the other 20 percent or so through energy loss due to friction and in various parts of the driving mechanism such as the gear).

The thermal efficiency of a large-scale diesel engine is of the order of 33 percent, which is much higher than that of the reciprocating engine, but approximately 67 percent of the thermal energy is still lost through the cooling water and the exhaust gas, distributed approximately equally between them.

Therefore, "loss of energy through a water cooling system can be eliminated if the combustion chamber is surrounded by ceramic parts, which are good insulators." (Director Hamano) In addition, if a turbocharger, which is in fashion today, is used to utilize the thermal energy in the exhaust gas, then the thermal efficiency of an adiabatic diesel engine can be raised to 48 percent, according to experimental data (U.S. Cummins engine). That is to say, "Using a ceramic diesel engine, the thermal efficiency can be raised approximately 30 percent over that of the conventional diesel engine in existence today." (Director Hamano)

The current ceramic diesel engine developed by Kyoto Ceramics has a combustion chamber completely made of ceramics, including the piston, cylinder, and cylinder head plate. Director Hamano himself has evaluated it and declared: "Every part that can be benefited by the use of ceramics has been made of ceramics. So it may be called an all ceramic engine." The prototype consists of a 2.8 liter, air-cooled, three-cylinder engine which is mounted on a Gemini (1.8 liter) for the road test.

Guided by Director Hamano, I visited the engine room. I saw in the room an engine without either a radiator for water cooling or a fan for air cooling. The external surface of the cylinder, dark glossy gray in color, was flat and its waistless body was bare, without the fins often found on an air-cooled cylinder.

With a staff member at the steering wheel, I took a ride in this car, which was only 20 days old (10 January), and was surprised to find that it was not noisy. The sound level may be just a little bit higher than in an ordinary diesel car. "Idling has not been adjusted yet," (Director Hamano) so some irregularity in engine revolution could be felt intermittently. But its acceleration performance appeared quite sufficient. Although the engine vibration was surprisingly heavy, it was probably unavoidable because a 2.8 liter engine was mounted on a Gemini designed for a 1.8 liter engine. The

exhaust gas was bluish in color. To be sure, there were many fine points that required adjustment because it was only a trial product, but the way it ran appeared quite satisfactory.

Director Hamano told me that the themes related to the practical application of a ceramic engine are as follows.

"Whatever one may say, the first is its cost. A large sum of money has already gone into this engine. The second is the confirmation of the reliability of its parts. Any defect in a ceramic part means instant destruction, so whether or not ceramic parts can be mass produced depends entirely on whether or not a nondestructive inspection method can be developed, so that thousands of manufactured parts can be inspected each day. Although X-ray fluoroscope and ultrasonic methods are being investigated, the success hinges on how to discover defective parts among complex shaped objects such as engine parts during the process of manufacturing. It may take many more years before these two problems can be solved."

Nondestructive inspection of defects is such an important part of the mass production process because, for the sake of safety, the auto makers impose very strict requirements on the reject rate of automobile parts. The reject rate of automobile parts is in general less than one-one hundredth, and the requirement on the engine, the heart, is even more strict. However, today's ceramic manufacturing technology has not yet realized an inspection technology which can guarantee this standard. The parts used in this trial engine were tested on-site by actually using them in the engine. The reliability of these parts were inspected by such a complicated and time-consuming nondestructive inspection method.

Race Between United States and Japan in Matters Related to Development of Application

Fine ceramics found immediate application in such fields as high-speed cutting tools and mechanical seals, but this was only the beginning. The true industrial application of fine ceramics depends on future R&D activities. Some possible applications that come to mind include material for construction of the vacuum chamber wall of a nuclear fision furnace, control rod of an atomic furnace, gas turbine for power generation, high-temperature heat exchanger, deep-well drilling equipment, and other items of the energy and machinery industries. In the meantime, the focus is on the automobile engine.

In the field of application to the automobile engine, the United States and Japan have already started a race for development. In the United States, an engine development law was enacted by the government in 1978, and the development of new high efficiency engines by the U.S. auto makers is backed by the government. The emphasis in the United States is centered around the development of a gas turbine type automobile engine. An example of a gas turbine type engine is the jet engine used on aircraft today. With this type of engine, the higher the combustion temperature, the higher the efficiency will be. Therefore, development of a new engine in which the combustion temperature is raised to 1,370° C through the use of ceramic parts is the goal.

Ford and GM have already managed to make a number of gas turbine parts with ceramics, and the United States would like to be able to mass-produce ceramic gas turbines for automobiles starting in the early 1990's.

In this field, the Japanese auto makers such as Toyota and Nissan have also been actively engaged in research and development. They say that there is no difference whatever between the technological development levels of the two countries. While nearly 10 years of additional development is considered to be required for the development of a ceramic gas turbine, the manufacture of a ceramic diesel engine is expected to be realizable by the latter half of the 1980's. In addition to the Japanese auto makers, Toshiba, NGK Spark Plug Co, and Kyoto Ceramics are also actively engaged in its development.

Of all these firms, Kyoto Ceramics started early, and in 1978 MITI designated its applications research on a ceramic diesel engine as one of the important national technological R&D themes. Over a period of three years ending in 1980, approximately 100 million yen in development subsidy was given to Kyoto Ceramics.

"Research activities related to the application of ceramics for engine parts has been brisk since the 1970's centered around the United States. So we, too, engaged in making ceramic pistons and cylinders. However, things did not go well. They all broke so easily....

"We decided to make our own engine five years ago. In April 1977 we hired mechanical engineers to join our group. At the same time, we began to tackle the problems related to making an engine in earnest through cooperation with Isuzu Motors Ltd, which has actual experience in building diesel engines. Since 1978, when it was decided that we were to receive MITI subsidy, we have been in the position that we had to do it.

"A single cylinder engine was tackled first, and by March of last year we managed to trial manufacture a small diesel engine with four cylinders. In this engine, only the piston crown, the cylinder liner, the cylinder head plate, and the preheat chamber were made of ceramics.

"Accumulating design after design, last November we began to make an all-ceramic engine.

"We chose to tackle the diesel engine because its fuel consumption is smaller than that of a gasoline engine; even the small engines used in family cars are turning to diesel. However, the main application of ceramics probably will be in the field of large diesel engines used in trucks and buses." (Director Hamano)

To understand how different this all-ceramic engine, which was successfully developed by Kyoto Ceramics, is compared with the conventional engine, the temperature inside an engine must be explained to some extent.

An ordinary automobile piston is made of aluminum, and it melts at a temperature of approximately 680° C. On the other hand, the temperature of the

combustion of gas is in the range of 800-900° C (a temperature regulated by the amount of fuel and oxygen admitted; the combustion temperature of a diesel engine is approximately 50° C higher than that of a gasoline engine). Therefore, in today's engines, the piston temperature is kept at about 350° C by means of circulating cooling water through the cylinder liner. In this case, the cylinder wall temperature is in the range of 150-200° C.

But in the ceramic engine made by Kyoto Ceramics which does not require either air cooling or water cooling, "the combustion gas temperature reaches about 1,500° C, while the cylinder wall temperature can reach 800° C." (Director Hamano)

Moreover, the ceramic used in the diesel engine of Kyoto Ceramics is a compound called silicon nitride. Although silicon nitride is slightly inferior to silicon carbide in its high-temperature strength, its heat insulating property is superior, so it is more suitable to a system which will not be cooled by either air or water. Silicon carbide has very good high-temperature strength but no heat insulating property, so it is suitable for construction of the combuster used in a gas turbine engine. (The high-temperature strength of silicon nitride is 1,500° C while that of silicon carbide is 1,600° C.)

Surprisingly Simple Manufacturing Process

We will touch upon the manufacturing process of ceramic products a little here. The Kokubu plant contains factories for manufacturing ceramic products in three different fields. There are three factories for the manufacture of semiconductor-realted parts, electronic parts, and industrial ceramics.

There are four processes that every product must undergo: preparation of raw material, molding, baking, and finishing. The case of laminated products, a process consisting of circuit printing and laminating is added in between molding and baking. In the case of metallized products, there is a process called high-temperature metallizing following the baking process. The indispensable processes are the four processes mentioned above. Moreover, the finishing referred to above means metal grazing and plating in the case of laminated products and metallized products, and grinding and polishing in the case of machined products.

I was allowed to have a tour of a plant (industrial ceramics plant) which is closed to outsiders. My impression of that plant, briefly, was the image of a modern foundry. The industrial ceramics plant consists of two rectangular buildings, each measuring approximately 30 meters wide, 100 meters long and 15 meters high. These floorless buildings of iron frames had uncluttered ceilings with the appearance of a large city factory.

The work in the plant begins with the molding stage. At the far end of the building are the molding machines. On the floor surrounding these machines are arranged many vinyl bags(the size of a cement bag) containing powdery material. These bags contain fine powdery raw material which is refined to a very high purity.

Several young men were transferring the powder from a bag to a thick-walled rubber cylinder, approximately 15 centimeters in diameter and 1 meter high. They tapped the floor with the cylinder to pack the powder after adding a small amount, and repeated this process with care. Depending on the size of the molded product, larger rubber cylinders are also used. I saw rubber cylinders as much as 3 meters high standing in the word area.

The rubber cylinder packed tightly with powder to the top is then molded by being put in a huge machine called a rubber press. The cylinder is transported by a movable crane suspended from the ceiling. First of all, the rubber cylinder is placed inside a cylindrical container made of wire mesh and is suspended from the crane. The metal container is approximately 1 meter in inside diameter and 2.5 meters high.

This container is transported by the crane to be placed inside the rubber press. As the rubber press is a machine which is buried deep underground, the container is lowered to a depth of 5-6 meters. The hole into which the container is lowered is filled with water. Thereafter, the powder is pressed under a pressure amounting to a thousand atmospheres (hydraulic pressure) by pumping oil into the press. The powder is said to be premixed with a kind of binder.

Scores of cylinders thus molded were arranged in the work area. The surface, to the touch, felt like a hardened fine plaster and it was somewhat damp.

The color is different for different raw materials, so it is easy to distinguish one from another. White molding is alumina; green molding is also alumina, but it will turn black after baking. Gray molding is silicon nitride, while gray mixed with brown is silicon carbide.

These moldings are cylindrical in shape, and they are next machined to the size of the product. Each cutting machine tool is manned by a worker. After machining, the workpieces are to be placed inside an oven and baked. Alumina products are baked and hardened inside a dome-shaped gas oven at a temperature of approximately 1,700° C. There were ovens of all sizes used for the baking of alumina, including large ovens of a diameter of about 5 meters.

In addition, there was an electric oven called a tunnel oven which was approximately 30 meters long. The interior of this oven was approximately 1 meter wide and 70 centimeters high; it was glowing bright red when I stooped down and looked into it.

Silicon nitride is baked inside a special oven called a vacuum oven in a nitrogen atmosphere which is free of oxygen. Silicon carbide is also baked in an electric oven of its own.

Different ovens are used for different products, but what is most surprising is the length of time the products must remain inside the oven. Although this also varies according to the product, the length of time may vary from as short as a day to as long as a week. This procedure is very time-consuming

because the baking temperature must be raised gradually, and cooling is done naturally by leaving the baked pieces in the air.

In addition to carrying out baking inside a baking oven, some products may also be baked by what is known as a hot press method. This method consists of simultaneous baking as the fine powder is molded in the press. Therefore, the machining process is eliminated from the work process described above, and both molding and baking are carried out in a single process. Reportedly, the strength can be improved by this method of baking.

The workpieces baked and hardened in the oven are then subjected to grinding and polishing carried out manually by the workers. Alumina ceramic parts used on a paper making machine were being manufactured. The surface of the finished parts felt slippery, like milky white marble to the touch.

In addition to the electromagnetic, thermal, and mechanical functions touched upon so far, ceramics have also drawn attention because of their biochemical functions. Interest in the development of ceramics for surgical materials such as artificial teeth and artificial bones has also been growing in recent years. Alumina and single crystal sapphire have already been found to be applicable as surgical materials because they are not rejected by the living body. An artificial tooth with an artificial tooth root screwed onto the jaw bone is said to be almost indistinguishable in function from the natural tooth, so it is expected to become a popular commodity in the future society with a high concentration of senior citizens.

Whether or not fine ceramics can actually become the third material after metals and resins depends on the future development. However, there is no doubt at all about the great potential for application of ceramics not only in the space field, like the heat shield tiles used on the space shuttle, but also in the fields of energy, electronics, and surgical materials.

What on Earth Is Amorphous Silicon?

The organization which leads the world today in R&D of amorphous silicon is the Central Research Laboratory of Sanyo Electric located in Maikata city, Osaka Prefecture.

The Central Research Laboratory of Sanyo Electric, standing on a height surrounded by a residential area, is the center of world attention today on matters related to solar photoelectric generation.

All this is the result of a patent application filed in the United States by Sanyo Electric. This basic patent, covering a wide range concerning an "integrated amorphous silicon solar cell," was granted and published in the United States in late November last year (the date the patent was approved by the U.S. Patent Office was 28 June).

The details of the patent actually involve 75 technological items from construction, manufacturing, to application. Almost all that can be thought of

concerning all "integrated amorphous silicon solar cell" is said to be covered by this patent.

A basic patent is commonly secured for an invention, but the fact that a Japanese enterprise was able to obtain a far-reaching basic patent in the field of such an advanced technological field was truely epoch-making.

The person who was directly responsible for this invention was Kotoku Kuwano, director of the Kuwano laboratory of the Central Research Laboratory. Mr Kuwano is only 41 years old, born in February 1941. Since research on amorphous silicon is said to have started in 1968, this invention is the fruit of 12 years' research effort.

Wine-Colored "Magic Board"

Now then, what features distinguish this amorphous silicon solar cell, the U.S. patent of which was won by Sanyo Electric, from the conventional single crystal silicon?

First of all, its manufacturing process is simpler. Amorphous silicon consists of three layers (P layer, I layer, and N layer). It is formed basically by the following procedure. Silane (SiH2) gas, which is a compound formed from silicon and hydrogen, is introduced into a low vacuum reactor in which a plasma reaction is induced by a high-frequency discharge. As a result, silane gas is decomposed by the energy of discharge, and amorphous silicon is deposited thinly on a baseboard.

Guided by director Kuwano, I had a tour of the Yodogawa branch office, which is usually closed to outsiders, and inspected the pilot plant. The plant (made of stainless steel) was in the shape of a rectangular box 1 meter wide, 40 centimeters high and 6 meters long. On the side of the box were five circular windows, approximately 10 centimeters in diameter, spaced at equal intervals. The plant was surprisingly small.

The presence of five windows signifies that there are five continuous processes taking place inside the box-shaped plant, and the progress of each process can be observed through the window. A glass baseboard (1.1 millimeter) with a transparent electrode (1,000 angstroms = 0.1 micron = one-ten thousandth of 1 millimeter) consisting of a thin film of tin oxide formed on it was laid on top of a plate approximately 50 centimeters square, and the plate was placed inside the plant to begin heating of the baseboard first of all. The interior of the plant was aglow in orange color as seen through the window. Heating continued until the baseboard temperature reached 300° C.

The plate carrying the heated baseboard was then advanced to the next station, where a P layer was to be formed. To form a P layer, diborane (B_2H_6) gas was added to the silane gas. The interior of the plant was aglow in violet color as seen through the second window, because a plasma discharge was taking place there. The P layer is only 200 angstroms in thickness (0.02 micron = two-100 thousandths of 1 millimeter).

After the P layer was formed, the I layer was to be formed next. Only silane gas was used for the formation of the I layer. This section was also aglow in violet color. The thickness of the I layer is 5,000 angstroms (0.5 micron).

After the I layer was formed, the N layer was to be formed next. Phosphine (PH_3) gas was added to the silane gas in this section, and the interior was again aglow in violet color. The thickness of the N layer is only 300-400 angstroms.

The final process was natural cooling. After cooling, the plate was removed from the plant. The entire process that went on inside the plant lasted approximately 30 minutes.

Incidentally, P layer is the abbreviation for positive layer, which consists of positive holes (positive charges). I layer is the abbreviation for intrinsic layer, which is also called neutral layer. N layer is the abbreviation for negative layer, which consists of electrons (negative charges).

Therefore, the diborane which was added in order to form the P layer was the so-called P type impurity, while phosphine which was added in order to form the N layer was the N type impurity.

The light energy striking the board is first of all transformed into electricity in the I layer, and positive charges (positive holes) and negative charges (electrons) are generated. These charges are then attracted to places where they can feel at home. So, P and N layers were formed at both ends of the silicon ahead of time to attract these charges. This is how a solar cell is made.

Incidentally, the rest of the process goes as follows. The amorphous silicon formed on the glass baseboard was then transported to a work process where aluminum electrode was to be vapor deposited onto the N layer. The aluminum electrode is 1 micron thick (one-thousandth of 1 millimeter) and is used to deliver the electricity.

Finally, the aluminum electrode was coated with a layer of resin as protection. The thickness of resin coating is of the order of 0.2 millimeters. At this point, the main body of the amorphous silicon solar cell, which is called a transparent conductive baseboard, was completed. All that remained to be done was to attach fine conductors at the two terminals of the aluminum electrode to turn the assembly into a "magic board" from which electricity could be obtained instantly by exposing the glass side to the sunlight.

The entire thickness of the board is only slightly more than 1.3 millimeters, and the thickness of the amorphous silicon portion consisting of P, I and N layers amounts to no more than about 6,000 angstrons (0.6 microns = six-ten thousandths of 1 millimeter). In other words, if the entire thickness of 1.3 millimeter were magnified 100,000 times to 130 meters, the thickness of the amorphous silicon portion would come to approximately 6 centimeters. The amorphous silicon is a deep wine color.

Cost Reduced at Once to One-Hundredth

This manufacturing method is called continuous separate formation method. This is also the world's first machine for mass-producing amorphous silicon solar cells, as indicated by the fact that a patent on this process was awarded to Sanyo Electric.

The manufacturing process described above is in fact simpler than the manufacturing process of single crystals. To produce single crystals, hydrogen is mixed with trichlorosilane, which is the raw material, and the mixture is heated in an electric oven called a polycrystal forming oven to a temperature of 1,000° C. As a result, the raw material is decomposed and blocks of polycrystalline silicon are formed. These blocks are called polycrystalline chunks. These chunks are further heated in an electric furnace called a single crystal forming oven to a high temperature of 1,500° C to melt them slowly in order to form single crystals. P type impurity is added at this stage, and a whole day is required to make single crystals. The process must be carried out slowly over a period of a day in order to get a fine crystalline structure, or to put the lattices in order.

The single crystal is then cut into thin slices and polished into wafers. These wafers are further heated in an electric oven called a diffusion oven to a temperature of 1,000° C in order to add N type impurity (gas) to it. It is called a diffusion process because the N type gas permeates the wafer. The main body of the single crystal solar cell is now formed.

In comparison with this complicated process, the amorphous silicon main body can be manufactured continuously in a gas reactor oven in a single process.

It is evident from the description of these two manufacturing processes that the second distinguishing feature of amorphous silicon is the fact that its baseboard is heated to a temperature of only 300° C, and less energy is consumed during its manufacturing process. The single crystal requires three processes involving high temperatures in the range of 1,000-1,500° C, and the entire process lasts a whole day. Consequently, more energy is consumed. The energy consumed in the production of single crystal is said to be 30 times greater than that of amorphous silicon.

The third distinguishing feature of amorphous silicon is the fact that the film thickness required is no more than 1 micron (0.6 micron in the previous example), with considerable savings in raw material. This is so because the high absorption coefficient of amorphous silicon is one order of magnitude (10 times) higher than that of single crystal.

A light-absorption coefficient which is 10 times greater means that the same amount of light can be absorbed by a film one-tenth the thickness. The rate of light absorption is better because the crystal is warped.

In the case of the single crystal, the thickness of the wafer comes to 300 microns, limited by the cutting technique (the limit is at best approximately

70 microns), which is 300 times the thickness of amorphous silicon. Moreover, approximately 40 percent of the single crystal is lost as a result of cutting.

Furthermore, the facts that amorphous silicon can be applied easily to a large area because it involves a gas reaction process and that inexpensive glass can be used as its baseboard are the additional distinguishing features of amorphous silicon.

Therefore, when amorphous silicon is mass-produced, its cost is expected to be less than one-hundredth the cost of single crystal.

Let us discuss further the "integrated" amorphous silicon developed by Sanyo Electric. This method provides a means of obtaining an arbitrarily high voltage from a single baseboard. The solar cell made of conventional single crystal silicon has its elements connected in a series one after another with lead wires, so its reliability is problematic. The "integrated" solar cell of Sanyo Electric works as follows. First of all, the transparent conductive film formed on the glass baseboard is constructed so that it has divided electrodes. Amorphous silicon is then formed over it. The terminals of the divided electrodes are constructed so that they protrude from the amorphous silicon film formed over them. When aluminum electrode is vapor deposited over the amorphous silicon film, the back side of the aluminum electrodes are connected to the corresponding divided terminals.

By this method, a sheet of amorphous silicon solar cell is in effect divided into a number of independent solar cells, and these cells are in series connection. Director Kuwano called this method of achieving series connection of solar cells through unique patterning of the mask "IC form of solar cell." He said that this idea was the key to practical application.

The reason this idea of "integration" is so decisive in realizing practical application is because a voltage of only 0.5 V can be obtained so far, no matter how bit the sheet of baseboard is, while the public electronic devices require a minimum voltage of 1.5 V as well as higher voltages including 3 V, 6 V, and 12 V. Great lateral freedom is afforded by this "integrated format," so the shape of the solar cell can be varied according to the application, and voltages ranging from several volts to as high as 100 volts can be obtained from a single baseboard. For his distinguished services in the development of the "integrated amorphous silicon solar cell" (type I was published in February 1979 and type II, in November 1979), Director Kuwano was recognized in April 1980 by an award presented by the director general of the Science and Technology Agency.

Development of this "integrated" amorphous silicon solar cell was the conclusive factor which led to the completion of the pilot plant described previously. This pilot plant began production of solar cells in May 1980, producing 5,000 solar cells per month. In September 1980, Sanyo Electric made public the world's first electronic calculator powered by an amorphous silicon solar cell.

The reason it was first applied to the electronic calculator was based on the fact that the sensitivity characteristics of amorphous silicon were roughly in agreement with the spectral (wavelength) distribution of the fluorescent lamp and it became operable with a light brighter than 200 lux, which is the minimum brightness with which the liquid crystal display becomes visible (the brightness of illumination in an ordinary office is more than 300 lux by regulation).

Another Important Factor--Photoelectric Conversion Efficiency

Let us touch briefly upon the history of amorphous silicon. The importance of an amorphous semiconductor was revealed to the world for the first time by Ovsinsky [phonetic] the director of an American venture business, "EDC," in 1968. However, the semiconductor material in fashion at that time was chalcogenite, so the study of an amorphous semiconductor did not develop very far.

Amorphous silicon caught the attention of the world in 1975, when a professor of Spear Dandy University in Great Britain made public the fact that amorphous silicon could be obtained from plasma deposition of silicon by means of glow discharge and that the amorphous silicon thus formed could be subjected to PIN control.

In the following year, 1976, RCA of the United States revealed that a solar cell could be made from amorphous silicon. This marked the beginning of application of amorphous silicon in electronic parts.

Prompted in part by the movement of the world, the Central Research Laboratory of Sanyo Electric had been undertaking similar research continuously for some time. For example, in 1967 Director Kuwano was already engaged in studying the glow discharge of amorphous silicon nitride, and his research results were published in 1969 in scientific journals.

Therefore, when Dr Carlson of RCA published his paper concerning an amorphous silicon solar cell, the news served only to fuel Mr Kuwano's fighting spirit and determination to "surpass RCA in the race."

To be sure, there was someone who scolded and encouraged Mr Kuwano. He was Executive Director Yamano (doctor of science) who was in charge of the Technology Headquarters (the Central Research Laboratory, the Development Research Laboratory, the Super LSI Technical Development Center, the Shioya Research Laboratory, and the Patent Center all belong to it).

Mr. Kuwano, it appeared, was dressed down by Executive Director Yamano: "Did you not start this eight years ago? It is inexcusable that you should lose it to Carlson." Incidentally, Executive Director Yamano is a graduate of the Science Department, Kyoto University, and studied under late Dr Hideki Yugawa.

Executive Director Yamano is generally considered the other parent of the Sanyo Electric amorphous silicon solar cell, because he was mainly responsible

for the guideline established in 1975: "Information and energy should be the two pillars of research activities."

"The impact of the oil shock in 1973 was immense. Up to that time, our research philosophy had put the emphasis on better living. Since 1975, the emphasis has been shifted to electronics in support of information and energy." (Executive Director Yamano)

The first fruit produced as a result of the union between the Yamano line and the Kuwano research was Japan's first amorphous silicon solar cell made public in October 1978. The following year, in February 1979, Sanyo Electric introduced the world's first electronic clock powered by an amorphous silicon solar cell.

This had a big impact on the world. Because Sanyo Electric had demonstrated to the world for the first time the possibility of amorphous silicon being used in an industrial application. Inquiries were said to have come even from the U.S. Embassy and RCA. Sanyo Electric had reversed the situation with regard to RCA.

After that, Sanyo was running alone so to speak, until it recently succeeded in obtaining a U.S. patent on its "integrated amorphous silicon solar cell" based on its continuous separated formation process. In industrial circles, almost all future amorphous silicon solar cells either manufactured in the United States or exported from Japan to the United States probably will be in conflict with the Sanyo patent right. The domestic makers of amorphous silicon solar cells, such as Fuji Electric and Taiyo Yuden, have all adopted the "integration" format developed by Sanyo Electric in commercializing their products. It is the consensus of opinion that there is no other way but to adopt the "integration" format. Director Kuwano, too, revealed his confidence: "They probably will infringe on the patent in many aspects, because this is a basic patent which covers such a wide range, which we could not avoid...."

In Japan, in addition to three plants under Sanyo Electric which have already begun production, Matsushita Battery Industry and Kanebuchi Chemistry have already expressed their desire to join in the manufacture and sales of amorphous silicon products. There are more than 40 enterprises undertaking R&D of amorphous solar cells today. If and when Sanyo Electric establishes its patent in Japan also, the possibility is very great that these firms will be obliged to pay license fees.

However, it is often pointed out that amorphous silicon has only one weak point compared with single crystal cilicon.

Its photoelectric conversion efficiency under sunlight is lower than that of single crystal silicon. As mentioned previously, amorphous silicon displays considerably better output characteristics (than single crystal silicon) under fluorescent light. However, under sunlight, single crystal silicon's sensitivity characteristics match the spectral distribution (wavelength range) of sunlight much better than those of amorphous silicon.

The photoelectric conversion efficiency is a measure of how well solar energy over the entire wavelength range can be converted into electricity. While this efficiency is in the range of 10-15 percent for single crystal silicon, it is only half this value for the best amorphous silicon of Sanyo Electric (7.9 percent for a small area 2 mm square and 5.6 percent for a large area 10 cm square).

Incidentally, a photoelectric conversion efficiency of 10 percent means that 100 W of electric power can be generated from an area 1 meter square.

Therefore, the main research theme related to amorphous silicon today is improvement of its photoelectric conversion efficiency.

Theoretically speaking, the photoelectric conversion efficiency of amorphous silicon can be raised to as high as 12.5 percent. Based on its past research experience, Sanyo Electric has boiled down the research themes to the following three.

First of all, the quality of the amorphous silicon film must be improved.

The P layer will be improved first. To facilitate the passage of light through the P layer, a method is being developed in which carbide (carbon) is to be added to the layer. This method was first developed in the laboratory of Prof Kakuhiro Hamakawa of Osaka University. Sanyo Electric is making preparations to use silicon carbide for the formation of the P layer in order to put it on the production line by April or June this year. (A photoelectric conversion efficiency of 5.6 percent for a large area referred to above utilizes this silicon carbide for the formation of its P layer. The photoelectric conversion efficiency of a large area solar cell commercially available today is only 3-4 percent.)

Adoption of silicon carbide means, in concrete terms, to add methane (CH_4) in addition to diborane and silane during the process of forming the P layer.

The I layer will be improved next. Using the same principle of gas reaction method, Sanyo Electric is said to be undertaking the development of a new method of forming (manufacturing) the I layer today.

The N layer will be improved last. The approach taken is similar to that of improving the P layer. Namely, a new additive is being investigated. In short, a substance is added which will more readily attract the negative charges.

The Central Research Laboratory of Sanyo Electric is said to have some definite ideas about how to carry out the research; it is confident that the photoelectric conversion efficiency can be improved significantly.

Director Kuwano said simply: "An efficiency of 10 percent should definitely be realizable by 1985."

So far, production of amorphous silicon solar cells remains small scale, so its cost is only slightly less than that of single crystal silicon.

However, Sanyo Electric estimates that the production cost of amorphous silicon solar cells will be down to approximately 200-300 yen per watt by 1985; 60-100 yen by 1988; and 3-50 yen by 1990.

This means that by 1990, with a cost of 150,000-300,000 yen an amorphous silicon solar cell having a capacity of 3 kW necessary for household application may become attainable.

Leading the world, Sanyo Electric itself began mass production in earnest in February at its amorphous silicon solar cell mass production plant built on Awaji Island, Hyogo Prefecture, with a monthly production volume of 1.5 million electronic calculators. It is truly a meteoric advancement of the amorphous silicon solar cell.

Splendid possibilities concerning the future of amorphous silicon solar cells are being discussed today. One of them concerns an idea for producing hydrogen energy, which is dubbed the future fuel, from electrolysis of sea water using amorphous solar cells.

Although it may be in the somewhat distant future, application of amorphous silicon solar cells may go beyond the bounds of national life and go into the field of electric power. That day need not be in the very distant future. Since the development of a storage battery is lagging behind, it is impossible to extend the utilization of amorphous silicon solar cells to night time. However, it is no longer merely a dream that the day may arrive when household appliances are powered by solar cells by day and by commercial power by night.

Director Yamano of the Technology Headquarters said this: "Last October, the minister of industry of India visited Japan and expressed India's desire to purchase solar cells. Solar cells may not be suitable for countries in northern latitudes, but they are most suitable for those developing countries where there is abundant sunlight. If Japan could contribute positively to the developing countries in securing solar energy, how wonderful it would be."

Compared with the discovery of basic principles, which often depends on good ideas, developing the first product is considered to be far more difficult. This is common sense in the field of research and development. Edison's achievement in relation to the invention of the light bulb is proof. In this sense, it would not be an overstatement to say that the two research achievements introduced in this article are comparable with Edison's.

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